

MAY 1955

35 CENTS

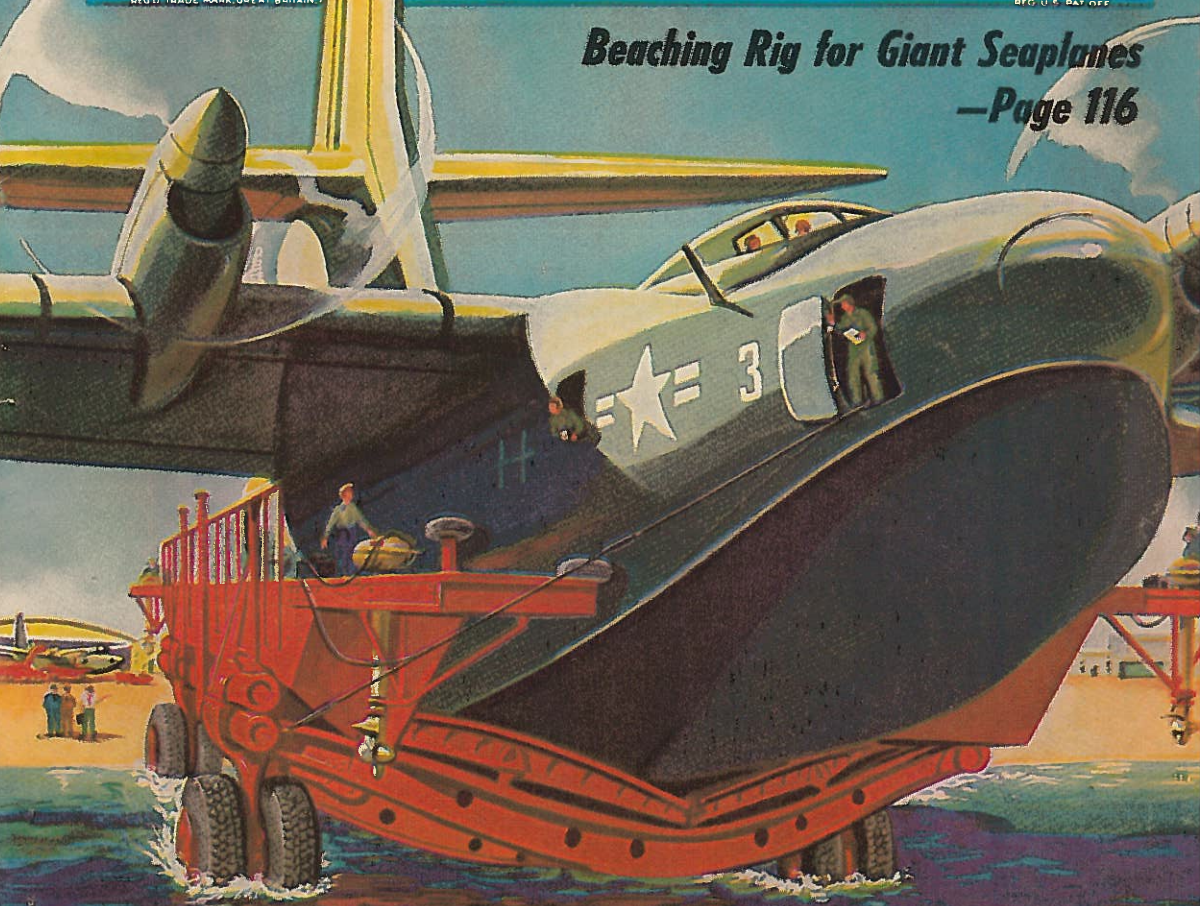
POPULAR MECHANICS MAGAZINE

WRITTEN SO YOU CAN UNDERSTAND IT

BIG D. TRADE MARK, GREAT BRITAIN

BIG U.S. PAY OFF

Beaching Rig for Giant Seaplanes
—Page 116



**What Owners Say About the
'55 PONTIAC**

HAVE WE SENT A ROCKET INTO SPACE?

For the Craftsman
BUILD YOUR OWN AIR BOAT

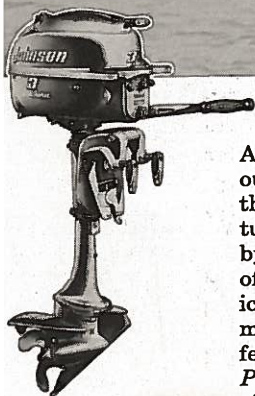


FIRST CHOICE!

America's resort operators buy 86% more Johnson Sea-Horses than any other make of outboard motor!



Sea-Horse 5 1/2—the only outboard motor ever to win a citation from the National Noise Abatement Council.



Ask the men who operate America's fishing resorts! They *know* outboards... Johnson Sea-Horses are their choice—BY 86%! On plans for future purchases, their choice is Johnson by more than 2 to 1*. Their favorite, of course, is the Sea-Horse 5 1/2—America's leading fishing motor. This is the model that offers modern "big motor" features with small motor handling ease. Plus Johnson's revolutionary "Suspension Drive" that brings *QUIET* to outboard boating. Your Johnson Dealer will show you. Look for his name under "Outboard Motors" in your classified telephone directory.

*From survey by "Resort Management"

SEA-HORSE 3. Another fishin' favorite! Full 3 hp. in a 32-lb. twin! Angle-matic Drive slides thru weeds, skis over under-water obstructions, keeps on driving in inches of water!

SEA-HORSE 25
Electric Starting ... 25 hp \$525.00*
SEA-HORSE 25 25 hp \$430.00*
SEA-HORSE 10 10 hp \$310.00*
SEA-HORSE 5 1/2 ... 5 1/2 hp \$210.00*
SEA-HORSE 3 3 hp \$145.00

*Includes Mile-Master Fuel System.



Prices f.o.b. factory, subject to change. All ratings are OBC certified brake hp. at 4000 rpm.

FREE! New Sea-Horse Catalog. Complete details. Write for your copy.

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400 Pershing Road, Waukegan, Illinois

A DIVISION OF OUTBOARD, MARINE & MANUFACTURING COMPANY

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Johnson

SEA-HORSES
FOR DEPENDABILITY

Texaco Tips On Car Care

Easy way to remove rust from car chrome

Use very fine steel wool, applied with plenty of "elbow grease"—but be sure to stay away from body paint. To remove road oil or asphalt spots, go over them with a little kerosene on a clean cloth. Then, for a bright, attractive gloss that stays rust-free, add a protective coating of car wax and give the chrome a final rub-down with a soft cloth.



Tested way to give your engine extra power and top protection



Use the motor oil that out-performs them all, regardless of price—Advanced Custom-Made Havoline. Competing in grueling road tests against some of the toughest motor oil competition on the market, Havoline proved its superiority. Results showed that Havoline-lubricated engines used less gasoline and oil . . . showed no appreciable wear . . . stayed far cleaner. For performance that pays off—more power, more money-saving protection—get Advanced Custom-Made Havoline today! See your Texaco Dealer...the best friend your car has ever had.



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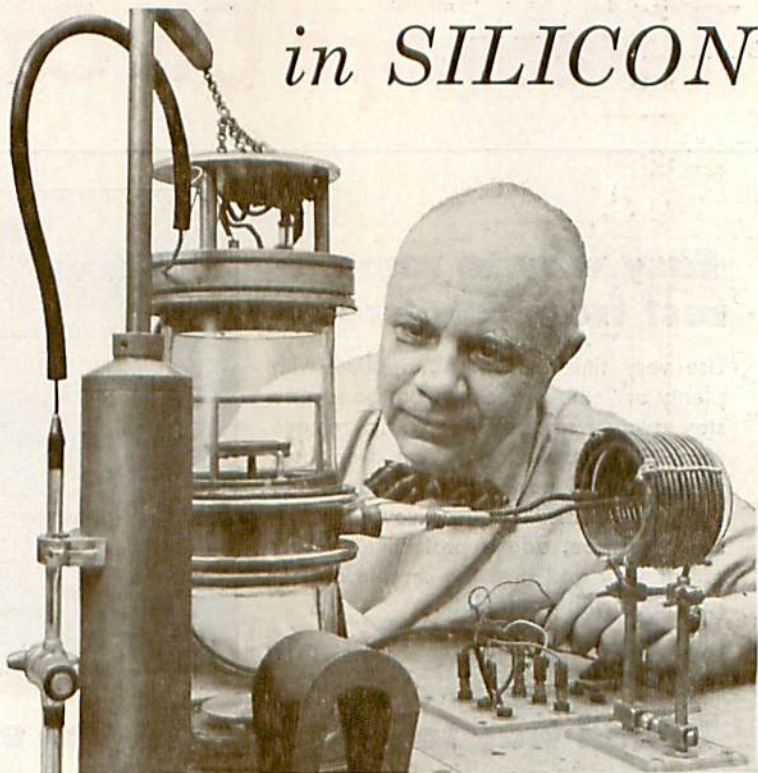
Texaco Products are also distributed in Canada and in Latin America

TUNE IN: TEXACO STAR THEATER starring JIMMY DURANTE or DONALD O'CONNOR on TV Saturday nights.

AN ADVENTURE

in SILICON

One example of junction technology at Bell Laboratories. Here a junction is produced on the surface of silicon by bombardment with alpha particles. Bombardment enhances silicon's performance at very high frequencies.



One day in the 'thirties a revolutionary adventure began for Bell scientists. They were testing an experimental silicon crystal they had grown to make microwave detectors.

Intriguingly, they found that one end of the crystal conducted by means of positive charges, the other end with negative. Positive and negative regions met in a mysterious barrier, or junction, that rectified, and was sensitive to light. It was something entirely new... with challenging possibilities.

The scientists went on to develop a theory of junction phenomena. They showed that two junctions placed back-to-back make an amplifier. They de-

vised ways to make reproducible junctions. Thus, junction technology came into being, and the 20th Century had a new horizon in electronics.

This technology has already produced at Bell Telephone Laboratories the versatile junction transistor (useful in amplifiers and switches); the silicon alloy diode (surpassingly efficient in electronic switching for computers); and the Bell Solar Battery which turns sunshine directly into useful amounts of electric current.

This is one of many adventures in science which make up the day-to-day work at Bell Laboratories... aimed at keeping America's telephone service the world's best.



Bell Telephone Laboratories

*Improving telephone service for America
provides careers for creative men in scientific and technical fields*

Popular Mechanics Magazine

Registered in U. S. Patent Office and Canada

H. H. WINDSOR, Founder

H. H. WINDSOR, JR., Editor and Publisher



Next Month

WHEN Benjamin S. Hamilton of La Mesa, Calif., was named No. 1 "ham" of the year, his pleasure was shared by Mrs. Hamilton and their 12-year-old son, Richard. When the local newspaper editor called to tell Ben they had a wire story on his being the winner of the Edison Amateur Radio Award, he thought there must be some mistake—but not for long. Long-distance calls almost jangled the Hamilton telephone off the wall. After weeks of being fêted and interviewed from coast to coast, Hamilton was glad to get back to the San Diego Junior College and Vocational School where he teaches industrial electronics. "Making a better mousetrap," he says, "has nothing at all on setting up a radio network for local civilian defense." You'll meet Ben in our June issue

Information not listed on articles in the index, starting on page 74, frequently is listed in the WHERE-TO-FIND-IT LIST, which is available to readers without charge. A copy may be obtained by writing to the Bureau of Information, Popular Mechanics, 200 E. Ontario, Chicago 11, Ill.

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Other items, and manufacturers of available products described, are listed on pages 74, 76 and 78

**WITH ORDINARY
HEADLAMPS:**
man changing
tire on road
ahead is almost
invisible in fog

**IDENTICAL SCENE
WITH NEW G-E
HEADLAMPS:**
man changing tire
is clearly seen
through the fog

3 WAYS G-E *All-Weather* HEADLAMPS MAKE NIGHT DRIVING SAFER THAN EVER BEFORE

1. HELP YOU SEE THROUGH FOG, RAIN, SNOW. Compare the actual photos above. Obstacles you can hardly see with ordinary headlamps (top photo) are clearly visible with new General Electric *All-Weather* Headlamps (bottom photo). Here's why:

With ordinary headlamps, some of the direct light from the filament shines upward in front of the windshield. The fog then mirrors it back into the driver's eyes as glare. His vision is reduced.



New G-E
Filament Shield

But with G-E *All-Weather* Headlamps, a built-in filament shield blocks off this uncontrolled upward light. The main beam is not affected. Result: much better visibility in fog, rain and snow.

2. HELP YOU SEE THE ROAD AGAINST ONCOMING HEADLAMPS. The light is focused better by a new-design reflector and lens. It extends the lighted area along the right side and shoulder of the road by as much as 80 feet. A big help in driving against oncoming headlamps!

3. GIVE 25% MORE LIGHT. Each beam of the 6-volt headlamp has 5 more watts; filaments are improved. The 25% increase in light shows up parked cars, curves and pedestrians that are out of range of ordinary headlamps.

Make your car safer for night driving with G-E *All-Weather* Headlamps now. Already approved in 44 states. Most garages and service stations have them or will soon.

G-E *All-Weather* HEADLAMPS



6 volt
per
pair

\$3.60

plus
nominal
installation
charge

12 volt \$3.80 per pair

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MATICO TILE FLOORING



*MATICO's New Improved
Install-It-Yourself System
Makes It Easy!*



1—Mark straight lines through the center of the room in both directions, using a chalk and line.

2—With a notched trowel, spread adhesive evenly over floor and allow to "set."



3—Press tiles into position. You can walk on MATICO as soon as floor is in place.



Yes, you can enjoy colorful, durable MATICO Asphalt Tile Flooring in your home at amazing low cost by installing MATICO yourself. You can't buy a more economical type of luxury flooring than MATICO. It lasts for years... is easy to keep sparkling clean and comes in 32 striking decorator colors that can't wear off because colors and marbleization go clear through the tile.

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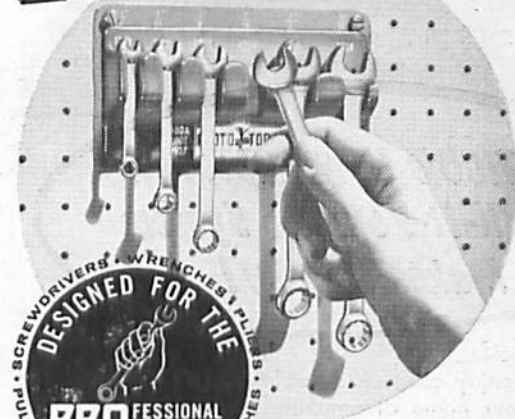
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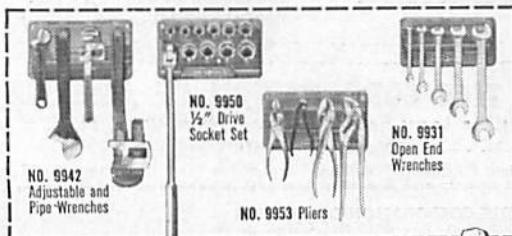


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ACROSS THE DESK



Henry Reider's Bone-O-Phone is probably the only musical instrument in the world made from the ribs of prehistoric animals, estimated by geologists to be about 7,000,000 years old!

Inventor Reider, chief preparator of the University of Nebraska's Museum, discovered that the rib fragments of fossil rhinoceros material taken from a Pliocene



formation in Nebraska's Brown County, produced a musical tone when struck. Since the quality of this tone differed from any other musical tone he had ever heard, Reider began to collect those ribs which had close-to-true pitch.

After several years and numerous grinding and filing operations to obtain just the right pitch, Reider finally reproduced two complete octaves of the chromatic scale.

Saga of a New Home

September, 1952, found my family moving to Connecticut. We wanted to own a home of our own, but didn't want high monthly payments. In Chicago, building a home yourself was practically out of the question. In Norwich, Conn., this could be

5581

Eastern Factory,
Jamestown, N.Y.
Canadian Factory,



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Assignment 1

THE BALANCE SHEET

QUOTING from the "Journal of Accountancy," the authoritative organ of the professional accountants of the United States:
"The accounting profession is probably the best paid profession in the world. If there be a profession in which the average compensation is higher, it is not known to us."
"There is need for accountants. There is ample compensation for accountants. There is no prospect that the supply will overtake the demand within the lifetime of even the youngest of us."

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Name..... Age.....

Street Address.....

City, Zone & State.....

Present Position.....



(Continued from page 6)

done on the outskirts. Never having been a carpenter or having any experience in building, I studied articles in your magazine, bought electrical and plumbing guides from your firm and studied them through. I figured that if someone else could do it, I could. Just before leaving Chicago I bought a \$2 copy of your plans for a concrete block house, "Build-It-Yourself Concrete Block House" by James R. Ward. This was just the house we had been looking for.



I bought an old 1½-ton high-stake truck to move our belongings and saved a \$500 charge for van moving. The truck cost \$200 and with a prayer it would get there. The wife and two children went by plane—the dog and I drove by truck.

At any rate, to cut the story short, we

are sending you pictures of our new *Popular Mechanics* home. The family has increased by one, totaling three daughters, and a new dog.

Though the interior of the house is not complete (we build as we get the where-withal) we are living in it and all essentials are in. We have not changed the floor plan at all; there are a few minor changes in the way of copper tubing, tiled bath and a fireplace. Thus far the house has weathered two hurricanes. In fact, when within, you'd hardly know the wind was blowing.

Oh yes, we did change the windows to steel casements and shoulder-high bedroom windows which make all walls of rooms more usable. Our house is within 250 feet of the scene of that Air France Constellation crash (summer 1954). We had reporters by the drove in the house interviewing the passengers, and CBS television set up in the kitchen and at the back door. If that plane had been a bit closer I wouldn't be writing you this letter now.

Due to the experience of building this home and having read your library of "how to do it" books I am now a carpenter 2nd class at Electric Boat Company.

David Steffenson,
R.F.D. 3,
Norwich, Conn.

(Continued to page 10)

"No porcupine hair for me! I keep my hair neat all day the new greaseless way"



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- ☐ Machine Shop Practice
- ☐ Mechanical Engineering
- ☐ Quality Control
- ☐ Reading Shop Blueprints
- ☐ Refrigeration
- ☐ Sheet Metal Worker
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- ☐ Toolmaking

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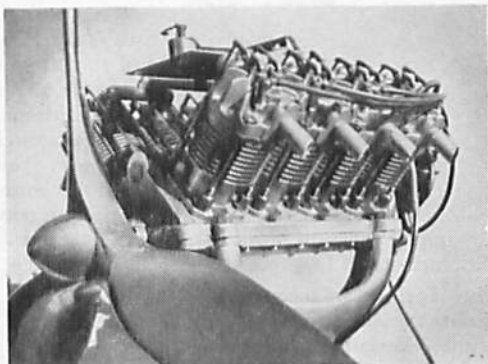
Finishing touch for every shave!
Neutral tint — crisp scent!

MENNEN AFTER-SHAVE TALC FOR MEN

(Continued from page 8)

To the Editor:

The miniature V8 motor in last October's issue (by Norman Seymour of Whittier, Calif.) prompted me to write and send you some pictures of my "Depression V8." I made it in the winters of 1930-31 and 1931-32; made all patterns and castings in my basement. All castings are aluminum. Cylinders have cast-iron sleeves. Pistons and connecting rods are of duralumin. Pistons have one cast-iron ring. Rods have babbitt-lined, brass-backed inserts. Spark plugs are of Bakelite with a piece of copper wire



for electrode sparking on side of cylinder wall. Size of plug is $\frac{5}{32}$ -inch diameter and $\frac{3}{4}$ inch long. Crankshaft is made of screw stock; five main bearings; flash chromium plated. Distributor is also of Bakelite. Motor also has an oil pump squirting a stream of oil on connecting rods. It is air-cooled, will turn 6500 r.p.m. with 13-inch three-blade prop. All parts were machined on my bench lathe and bench drill press. Motor has $\frac{5}{16}$ -inch bore and $\frac{3}{4}$ -inch stroke; less than $1\frac{1}{2}$ -cubic-inch piston displacement. Total cash output for "Depression V8" was \$1.50 for crankshaft plating and \$.75 for timing gears.

Richard Guenther,
20623 Masonic,
Fraser, Mich.

To the Editor:

May I inquire whether or not the French publication *Mecanique Populaire* is the French edition of my favorite magazine or an expression of "the sincerest form of flattery"?

Ernest J. Ascher,
Concord, Calif.

It's ours, established in 1947 and doing right well, thanks. Since then we have added Spanish (mostly for South America), Danish and Swedish editions.

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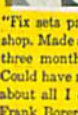
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I TRAINED THESE MEN



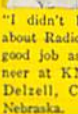
"I have progressed very rapidly. My present position is Studio Supervisor with KEDD Television, Wichita."—Elmer Frewaldt, 3026 Stadium, Wichita, Kans.



"Fix sets part time in my shop. Made about \$500 first three months of the year. Could have more but this is about all I can handle."—Frank Borer, Lorain, Ohio.



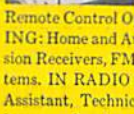
"I've come a long way in Radio and Television since graduating. Have my own business on Main Street."—Joe Travers, Asbury Park, New Jersey.



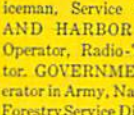
"I didn't know a thing about Radio. Now have a good job as Studio Engineer at KMMJ."—Bill Delzell, Central City, Nebraska.



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GOVERNMENT RADIO: Operator in Army, Navy, Marine Corps, Forestry Service Dispatcher, Airways Radio Operator. **AVIATION RADIO:** Transmitter Technician, Receiver Technician, Airport Transmitter Operator.



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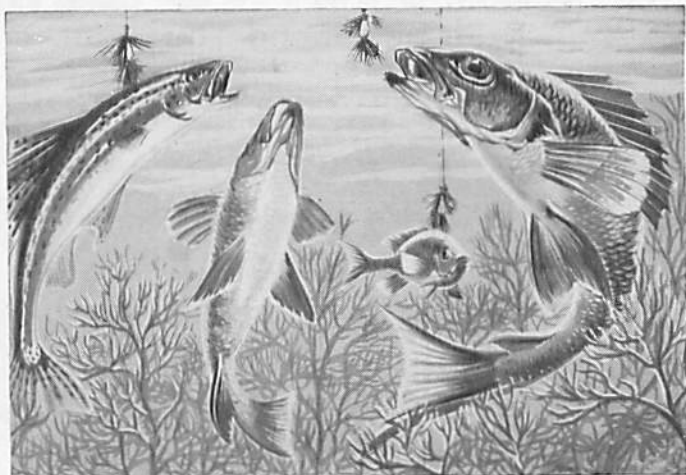


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SCIENTISTS DISCOVER STRANGE HABITS OF SEA LIFE

Man has been fishing since the dawn of time. Yet during countless centuries he's never really known much about sea life. Then leading scientists from all over the world got on the job, including the U. S. Dept. of Fisheries. Ichthyologists, chemists, zoologists and sportsmen joined in the quest. Millions of dollars were spent on gigantic glass aquariums, sub-marine cameras, recording devices and lab equipment. In less than a generation man learned more about the mysteries of sea life than in the previous 10,000 years!

EXPERIMENTS PROVE FISH ARE ALMOST BLIND

Here is the most startling discovery that the scientists unearthed: most fish—of ALL species—have very poor eyesight compared to birds and mammals. Some are almost blind! No wonder, then, that you can use the most attractive dry lures—yet go home after a day's fishing excursion with little to show for it but a sunburn!

It doesn't make much difference how good the bait is you use nor how hungry a fish may be—if he doesn't SEE it, if he isn't DRAWN to it, you won't

get a nibble! And test after test proved that unless you get the lure right under the fish's nose, you simply cannot attract him to your hook!

NEW "MATING-HUNGER" FISH LURE DEVELOPED BY GERMAN CHEMIST

The new LURENE formula was developed by a German chemist, a graduate of the University of Tübingen in Württemberg, Germany. An acknowledged leader in his profession, he knew that certain lures and bait failed simply because many fish were nearly blind. But he learned that Mother Nature in her bounty provided fish with extra powerful sense-instincts that led them irresistibly to their food supply. This sense-instinct for want of a better name may be called SMELL-TASTE. In other words, a fish both SMELLS and TASTES at one and the same time! For this purpose, the bodies of fish are covered with thousands upon thousands of tiny smell organs—without which life would be impossible. Armed with this knowledge, the eminent chemist finally developed the now famous LURENE formula.

NOW!—SURVIVAL INSTINCT ADDS EXTRA "PUNCH"

Scientists have long known that the mating factor is one of the most compelling instincts in sea life. Fish go to fantastic lengths to fertilize their eggs. They travel countless miles to fertilize them—go through incredible torture, accomplish almost impossible tasks. One of the most wondrous sights of nature is to watch male salmon struggle up river fish-ladders to fertilize the spawn. NOW—for the first time ever—natural extracts have been added to the new LURENE formula. This has increased production costs considerably—but you'll agree after using it that it's certainly worth it! And it's SO easy to use—just dab a little on the plug or bait, drop it in the water and fish as usual. LURENE works in lakes, streams, ponds or in the ocean. It makes no difference if you still-fish, troll, cast or spin. LURENE disperses in the water, giving you greater PENETRATION, longer RANGE and far more ATTRACTION POWER.

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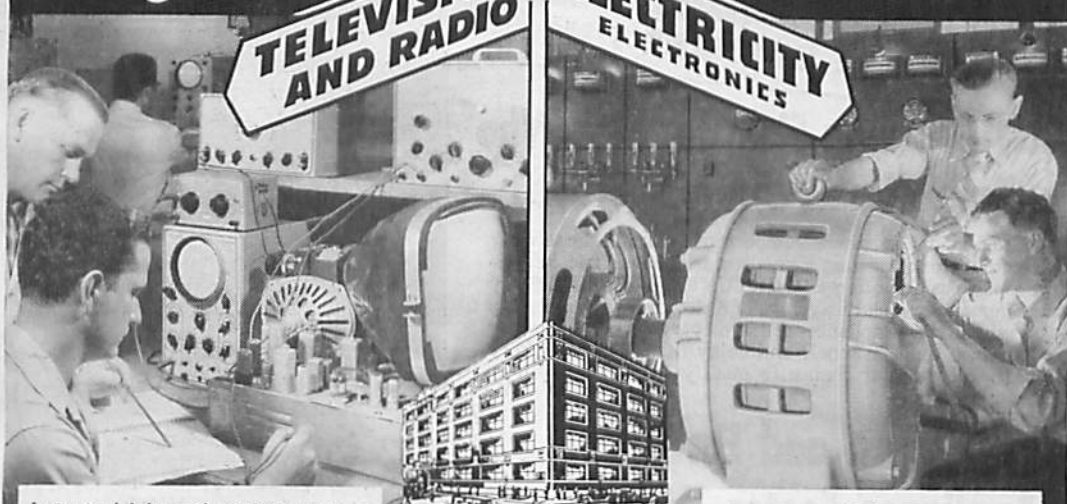
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The firm of McMorrow, Berman & Davidson, with offices in Washington, D. C., is qualified to take the necessary steps for you. We can make a preliminary search on your invention, advise you whether we think it can be patented, and prepare your application for patent.

Unless you are fully familiar with the U. S. Patent Laws, we recommend that you engage the services of a Registered Patent Attorney to protect your interests. The patent laws are *your* laws. A patent gives you the right to prevent others from making, using or selling the invention claimed in your patent for a period of 17 years.

Use these patent laws for your protection. Investigate whether your invention can be patented. If you have what you believe to be an invention, we suggest that you have this firm make a search for you.

Send for a copy of our Patent Booklet entitled "How To Protect Your Invention," containing information about patent protection and patent procedure. Along with this we will also send you an "Invention Record" form, for your use in writing down and sketching details of your invention. We will mail them promptly. No obligation. They are yours for the asking.

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BENJAMIN FRANKLIN
(A Rosicrucian)

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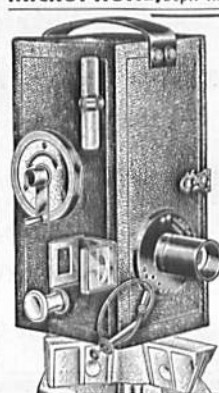
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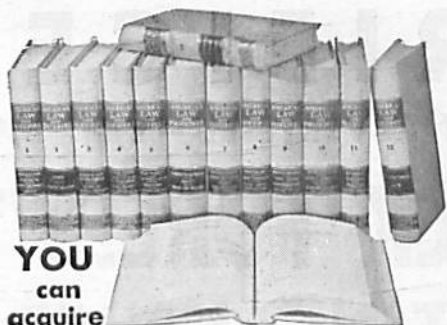
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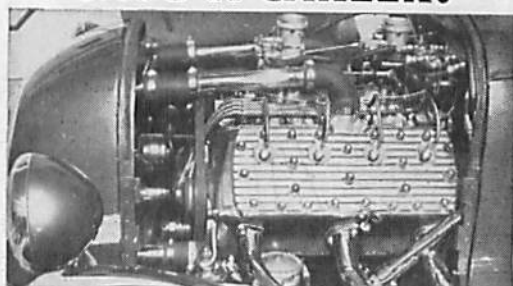
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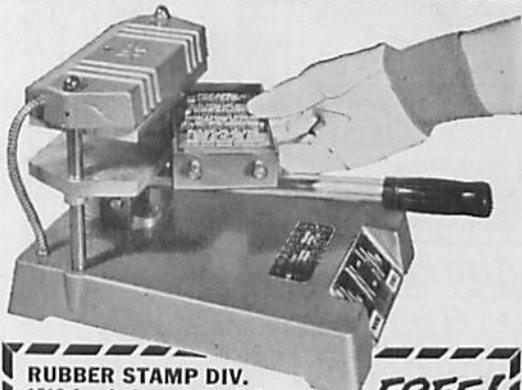


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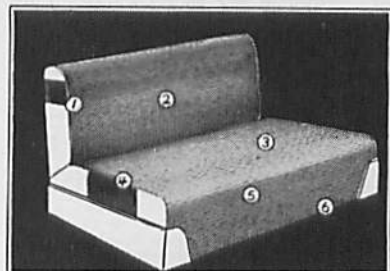
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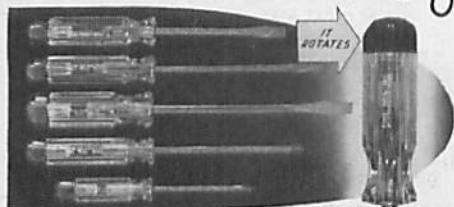
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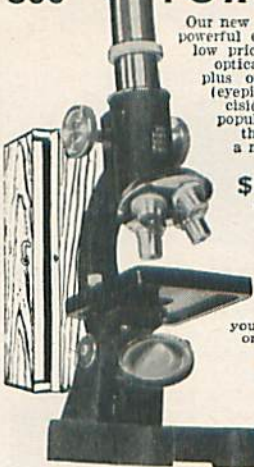
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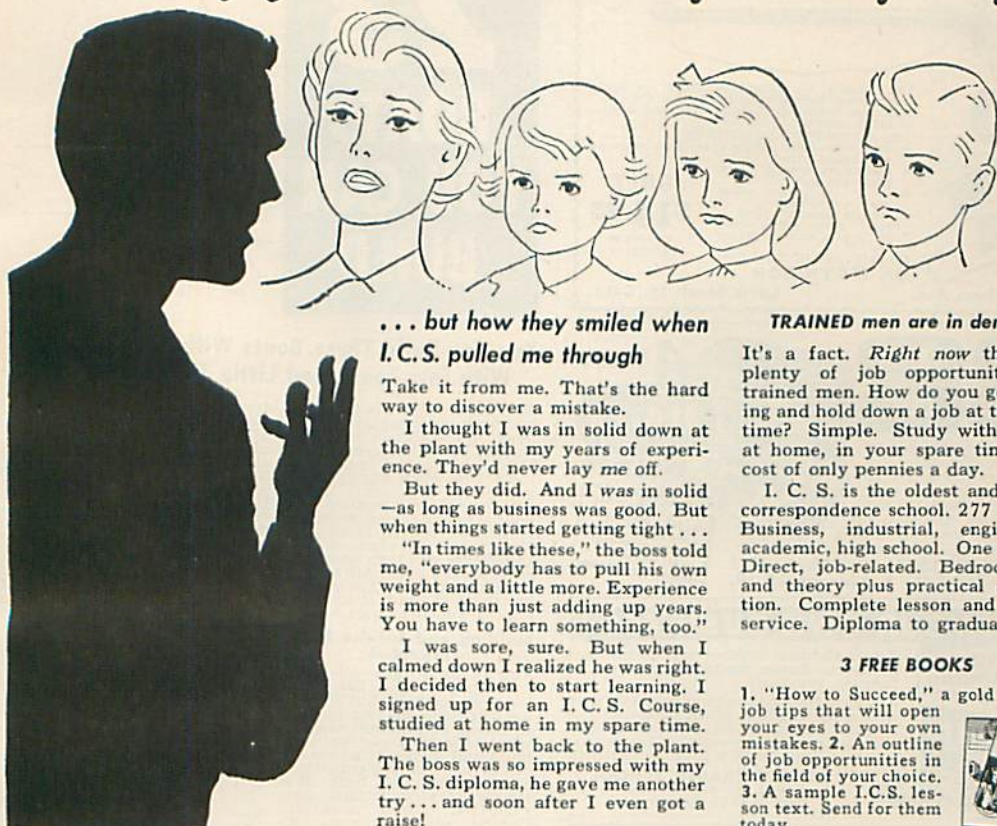
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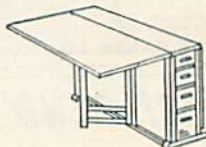
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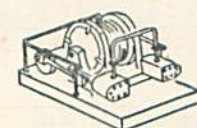
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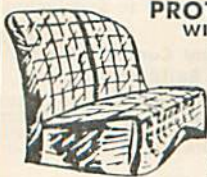
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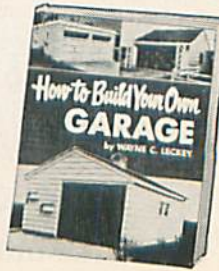
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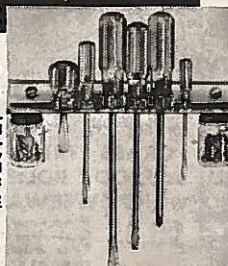
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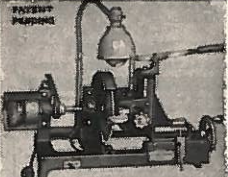
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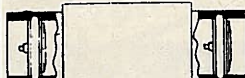


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Extra Large Capacity. Powerful #9 pumps 15,000 gph. 3000 gph. 95' high 7000 gph. from 25' well. Rustproof alloy metal. 8 blade impeller. 1 1/2" inlet, 1 1/2" outlet. Standard pipe threaded. Uses 1/2 to 2 H.P. motor. Will not leak or clog. Ironclad guarantee. Send **\$1495** U.S. check, M.O., or sent C.O.D.

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Built-in acid neutralizer

Revolutionary New

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Gives 5-way Engine Protection!

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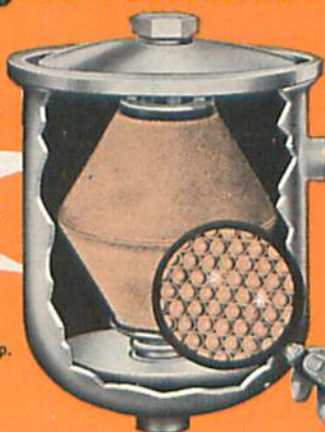
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FILTERS THE DIRT BUT NOT THE DETERGENTS

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CITY_____ ZONE_____ STATE_____



Increases engine life



Never need replacing



Unaffected by pressure



Screens out abrasives



Efficient at all temperatures



Fits all cars



Eliminates acid



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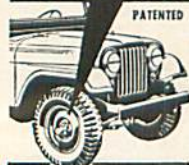
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BASS Says: Quality cameras since 1910. When in Chicago visit the camera crossroads of the world, or write us for your favorite equipment, new or used. Satisfaction guaranteed. Bass Camera Co., Dept. AG, 179 W. Madison St., Chicago 2, Ill.

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WHOLESALE: 1000 Items nationally advertised appliances, jewelry, watches. Catalog 50c. International Sales Co., 175 Fifth Ave., New York 10, N. Y.

MERCHANTS Turn tables easily made your shop. Plans \$1.00 refunded with purchase of meters or parts. Meterized Displays, Box 319, Reno, Nevada.

YOUR Own name brand business. No investment; no inventory. Part time or full time. Sell famous brands of appliances, housewares, silverware, radios, vacuum cleaners, lamps, tools, clocks, watches, jewelry, etc., etc., over 1000 items. Join thousands of successful independent dealers. Send for free catalog and dealer price list. H. B. Davis Corp., Dept. W, 145 W. 15 St., New York City.

WINNING Mail order plans. Merchandise, books. Details free. Mid-State, Box 214-A, Syracuse 1, N. Y.

REVEALING Booklet "How To Sell By Mail" 25c. Bud E. Hine, Box 93, Battle Creek, Michigan.

MAIL Order success. Follow our suggestions. Informative treatise 25c. Griffie Enterprises, Box 91, Station D, Toledo 8, Ohio.

DIRECT Factory distributors wanted for well known automotive product. \$1000 inventory turns over fast with 50% profit. Exclusive sales rights. Write Sales Manager, 6329 Wilson Ave., St. Louis 10, Mo.

BUY Wholesale. Thousands items. Lists free. Triple J Industries, 132 Berkshire, Bridgeport 8, Conn.

OPERATE Home collection agency spare-time. No experience. Wonderful profits. Amazing facts free. Posey, Roan Mountain, Tenn.

PARTNERSHIP Information. How to start. Withdraw. Oust unwanted partner. Particulars free. Reynard, Box 1265-B, Peoria, Ill.

EASY Handwork makes fast-selling useful articles. Sample free. Sunmade Company, Brockton 64, Massachusetts.

\$46 FROM Square foot plywood; jigsaw necessary. Write: Woodarts, Bridgewater, Mass.

MAKE Money at home as renewal headquarters for all magazines. Big profits now. Liberal commissions. Supplies furnished. Experience unnecessary. Write for free catalog. McGregor Magazine Agency, Dept. 500-B, Mount Morris, Illinois.

"FROG Raising!" Season just starting! Get this year's eggs. New book tells how. Free folder. Broel-A, Box 506, New Orleans 1, Louisiana.

\$10,000 YEAR Easy! Own your own sales and buying service business without investment or inventory through America's (2) greatest wholesale catalogs! Appliances, housewares, furniture, cameras, sporting goods, toys! Free catalog plans! General Wholesalers, Box 3058EG, San Francisco.

WEALTH. Independence, security. Valuable, proven, "mallorder manual." Send \$1.00. Haase Company, 2719 East Washington, Madison, Wisconsin. Satisfaction guaranteed.

FLEXIBLE Rubber molds for plaster and Marble figurines. Sample and large illustrated catalog 25c, refunded on first order. K-C Novelties, Dept. 155, Southampton, Mass.

WHOLESALE! 12,000 Nationally famous products. 30-80% discounts! "Wholesale trade secrets" catalog. Sensational business plans free. Derron Company, 21-11 White, Paterson 23, New Jersey.

ADVERTISING Book matches—Cash in on big demand; sell union label matches. Cuts for all businesses and political parties. Free powerhouse selling kit, low prices, prompt guaranteed on repeat orders. Cash commissions. Superior Match Co., Dept. MX-555, 7530 Greenwood, Chicago.

WHOLESALE! Complete line musical instruments, phonographs, tape recorders, typewriters, watches, diamond rings, appliances, etc. Discounts to 75%! Send 25c (refundable) for large catalog. Strauss Music Company, 25-11 Lafayette, Paterson 23, New Jersey.

OPPORTUNITY Seekers names 60 days old. All seeking ways to make money at home. 1,000 \$8.00. Typed on gummed labels. Two copies \$10.50. Ken-West Distributors, 7-KB South Harlem St., Worcester 4, Mass.

UNUSUAL Opportunity. Spinning at home. Supplies, market, furnished. Angora House, PM, Springfield, Illinois.

SAVE 20% To 50%. Buy wholesale nationally advertised merchandise. Free details! Beecher Sales, Box 2161-B, Cincinnati 1, Ohio.

MAKE Durable building plastic, easily. Beautiful, tough. 101 uses. Exclusive district. Unlimited demand. 800% profit. Bays Laboratory, Oklahoma City 9.

START Your own business at home. Sell subscriptions for popular magazines. Liberal commissions. Send for supplies, etc. DeSales Magazine Service, 60 East 42nd St., New York 17, N. Y.

FANTASTIC Profits in your own wholesale buying service! Buy 66 2/3% less than retail 10,000 famous appliances, housewares, jewelry, sporting goods, furniture, toys. Sell others at discounts! Free details! National Buyers Service, Box 428EP, Oakland, California.

LEARN To sell by mail. Inexpensive course reveals how. Ransie, Box 1719-B, Richmond 14, Virginia.

121 METHODS. Home moneymaking without capital. Completely new. Rush \$1.00. Brockway, 1145 High, Topeka 1, Kansas.

START Your own business. "137 home money-making business plans." Descriptions free. Ferguson, Box 524, Indianapolis, Indiana.

SAWDUST. Turn it into cash. Twenty methods. Instructions 50c. Charles Company, 12-DEA, Norwood, Ohio.

AMAZING Business of your own without capital. No merchandise to sell or stock needed. Plans complete \$2.00. Survey, Box 336, Oceana, Va.

THIS Is It! Your home business on \$15.00. Unusual profits in undeveloped scientific field. Details \$1.00. T & W, Box 369, Great Neck, New York.

WATERPROOFING Contractors make big money waterproofing basements, masonry walls, swimming pools with guaranteed Myti-Dri waterproofings. Establish your own business. Myti-Dri Waterproofings, Herndon, Va.

GREETING Cards—Anniversary, illness, etc. 300% profit. Freeman's, Cornwall, Ontario.

JOBBER. Rubber mats to stores, for home, business, auto. No inventory, no capital required; also jobber, volume advertising specialties in rubber for counter, display, door. Will drop ship and invoice rated accounts. Mitchell Rubber Prod., Attn: W. B. Gardiner, 2134 San Fernando Rd., Los Angeles 65, Calif.

MAKE Money in landscaping. Start your own business, part or full time. Many good paying positions open. Earn while learning. Write for free book. National Landscape Institute, Dept. M-55, 310 S. Robertson Blvd., Los Angeles 48.

YOU Can be president of your own company with no capital or experience. Free booklet "Ten Ways to Make Money in Your Own Business" shows you how. We ship orders under your name. Topval, Lindenhurst 218, N. Y.

LEARN Flower arrangement and floristry. Start your own business, part or full time. Many good paying positions open. Earn while learning. Send for free book. National Landscape Institute, Studio M-55, 310 S. Robertson Blvd., Los Angeles 48.

MONEYMAKING OPPORTUNITIES

"HOW To Make Money With Simple Cartoons"—A book everyone who likes to draw should have. It's free; no obligation. Simply address Cartoonists' Exchange, Dept. 95CM, Pleasant Hill, Ohio.

700% PROFIT. How? Free particulars. Hardy's, 878 East Waterloo, Akron 6, Ohio.

COST Of things going up faster than your income? You can make more full or part time as a Rawleigh dealer. Write for full particulars. Rawleigh's, Dept. E-RR-PPM, Freeport, Ill.

FREE! "301 Profitable Small Businesses!" Amazing shoestring plans! Work home! Start sparetime. Deumant Surveys, Kenmore 23-PM, N. Y.

START A buying service, buy wholesale thousands nationally advertised products. Make big profits selling at sizable discounts. Postcard brings details. American Buyers, 630-P Linden, Buffalo, N. Y.

SELL Religious mottoes. Send no money. We trust you. Crystalglo, Sidney, Ohio.

EARN Money evenings, copying and duplicating comic cartoons for advertisers. Adservice, Argyle 1, Wisconsin.

NEW 7"x11" Ultra-blue signs. 7c, retail 50c. Sample free! Lowy, 812 Broadway, Dept. 863, New York 3.

CASH Profits. Supply prospects for stupendous silverware deal. We do selling. Raymond Lindblom, 216 West Jackson, Chicago 6.

SELL Merchandise, books by mail. Orders filled for you. Unlimited earnings. Experience unnecessary. Free folder. Thomas, 276 Weaver Street, Rochester 21, New York.

MAKE To \$300 extra. New! Different! No selling! No mallorder! Details free. J-M Enterprises, 801 1/2-A North Marsalis, Dallas 3, Texas.

RURAL Moneymaker! 400% profit making distinctive 3-color mailbox nameplates! No tools required. Instructions including your nameplate \$1.00. Gemery Studio, 365 Long Hill Ave., Shelton, Conn.

MAKE Money! Booklet, "101 Ideas for Home Business," only 25c! Evans, 830 1/2 East 13th, Ada, Oklahoma.

\$200 MONTHLY Possible raising earthworms! Backyard, garage, basement. Complete illustrated booklet explains raising, feeding, packing, marketing. 25c postpaid! Ozark Worm Farm-J, Willow Springs, Missouri.

SAVE \$50.00-\$100.00. Make your garage as modern as your home. Open and close your garage door right from your car with an amazing Door-O-Matic electric garage door operator. New 1955 models for as little as \$129.50. Attaches to any overhead door, preassembled at factory for easy installation, complete with full size motor. Write for details. Door-O-Matic Co., Dept. 70, Russia, Ohio.

HOME Business opportunity! Mailing literature featuring books, merchandise. Everything supplied. National, Box 88, Dorchester 22A, Massachusetts.

WHOLESALE — Nationally advertised merchandise. Up to 40% off. Auto parts, hardware, appliances, jewelry, watches, clothes, diamonds. Send dime for particulars. Brian Cerva, Box 224, LaGrange, Illinois.

MEN'S Electric shavers, ladies' hair-movers—Sell \$9.95. Send \$3.85. Postpaid. Marsano's Sales, 2870 Coolidge, Berkeley, Michigan.

ALUMINUM Awnings—Sell yourself, sell neighbors. Baked enamel colors, ventilated. Factory prices. Write Groff Awnings, Box 10254, Tampa, Florida.

AMAZING: Moneymaking opportunities, plans. Mail Gazette has them. Dime brings copy. A. W. Vornheder, 11321 East 39th Terrace, Kansas City 29, Missouri.

SELL Merchandise by mail. Everything supplied. Big profits. Details free. Stull's Buying Service, Box 415, Scranton, Penna.

BUY, Sell and swap for profit. Amazing new method. Inquire Box 621G, Culver City, Calif.

LEARN Technical metaphysics and insure your future. Easy, inexpensive correspondence course. Simplest method known. Diploma. Write: Premier College of Technical Metaphysics, 2532 McKenzie St., Vancouver, B.C., Canada.

DOLLARS In baby record books, baby shoe kits. Liebig Industries, Beaver Dam 2, Wisconsin.

PROFIT! Prestige! Publish a magazine under your own name! Only \$3 per month! Sample, details 5c! Filmer, 910 Marion, Springfield 22, Texas.

PRINTING And office supplies wholesale, 20,000 items. Literature free. Royal, Box 368-A, Cleveland 27, Ohio.

FREE Literature describing moneymaking mallorder plans. Lewis Barlett, Richmond, Georgia.

BUILD Sales by recruiting productive distributors selling direct or to retail outlets. Secure most concentrated circulation through classified columns of Salesman's Opportunity. Write for facts. Gilbert, Salesman's Opportunity, Room 1700, 850 N. Dearborn, Chicago 40.

FREE Booklet "Money Making Facts" tells mechanically inclined men how to start sparetime business at home. V. Foley Company, Columbia Heights, Minnesota.

ACME Saw sharpeners are the finest you can own. Don't be satisfied with less. Send for free literature. Max Mfg. Co., 138 Stockton Ave., San Jose 26, California.

FREE Folio "Up to \$45,000; Unlimited Vacations." No merchandise, equipment. Unknown! Work home, sparetime! Haylings, Carlsbad, Calif.

SPARETIME Profits taking subscriptions all magazines. Wholesale catalog free. Cassell Publishers, Westfield, New Jersey.

MAKE TO \$4.50 hour doing common pen lettering. National Artists, 801 1/2-A North Main, Dallas 3, Texas.

ATTENTION: Typewriter owners. Make handsome profits. Write today. Groves Company, 682 Hastings 8, Nebraska.

GENERAL Contest Bulletin. Issued monthly. Sample, 25c. 1609 1/2 East 5th, Duluth, Minn.

GROW Mushrooms. Cellar, shed, and outdoors. Spare, full time, year round. We pay \$3.50 lb. We paid Babbitt \$1,650.00 in few weeks. Free book. Washington Mushroom Ind., Dept. 173, 2954 Admiral Way, Seattle, Washington.

50,000 ARTICLES Wholesale. Source directory, dime. Nelko, Box 3462-DR, Chicago 54.

READ Progressive Mailtrade, the magazine that tells how to make money by mail. Dime brings sample and special offer. Progressive Mailtrade, Box 357, Sheboygan, Wisconsin.

FREE Book "505 Odd, Successful Businesses." Work home. Expect something odd! Pacific, Oceanside, Calif.

SELL—Buy Titania gems. More brilliant than diamonds. \$9.75 carat wholesale. Free catalogue. Diamondite, 1404-M Mitchell, Oakland 1, California.

"MONEY Getter's Bulletin." This exciting magazine prints money-making plans, ideas, spare-time tips; hobby ideas; many other types of money-making facts for men, women; young or old. Order your sample copy today; only 25c. Hurry. Distributors, Box 831-B, Monessen, Penna.

GIANT Mails. Money-making offers. Send 25c today! Wrede, Atkinson, N.C.

"HOW To Make Money with a Camera." Send \$1 to Photos, Box 526, National City, California.

MONEY Troubles? The book you need is, "Dollar Maker Tips." A gold mine of information and knowledge. Contains 1000 valuable dollar making "tips." \$2.00 post-paid. Money back if dissatisfied. Suthoff, Box 303, Moss Point, Miss.

GROW Earthworms. Sell breeding stock. Soil culture, fishbait. Home business opportunity. Write Earthworms, Corona, California.

SELL Snowballs. Fourteen delicious syrup flavors. Ice shavers, supplies, outfits, catalog. Snowball Company, 9534-P, Lemturner, Jacksonville 8, Florida.

AT Wholesale! Standard brands merchandise, for home, business, hobbies, personal use or profitable resale. Catalog \$1.00 refundable. Metropolitan, 1966 Evergreen, Chicago 22.

GET INTO your own big paying weather-strip business. E-Z-On 11, 1009 Harvard, Evanston, Ill.

SELL! Round bobbin sewing machines. Built in darning, embroidery. Retail \$189.50. Send \$39.95 for full size portable and details. Vasco, Box 275, Freeport, Penna.

MAILORDER Business spare time book "Doing Business by Mail." Every business scheme fully explained, \$1.00. Ken-West Distributors, 7-KB South Harlem St., Worcester 4, Mass.

121 METHODS. Home money-making without capital. Completely new. Rush \$1.00. Brockway, 1145 High, Topeka 1, Kansas.

WHOLESALE! 12,000 Nationally famous products. 30-80% discounts! "Wholesale Trade Secrets" catalog. Sensational business plans free. Derrom Company, 21-12 White, Paterson 23, New Jersey.

MAKE Money. Address: mail new self-selling catalog; big profits: 25c for sample; complete details. Ken-West Distributors, 7-KB South Harlem St., Worcester 4, Mass.

BUY Wholesale! 10,000 name brand products! Save 66%! Big profits selling others spare time! Free details. National Buyers Service, Box 426EE, Oakland, California.

MAKE Money helping others get out of debt, stop garnishments, save jobs, reestablish credit. Particulars free. Borum, R7, 411 West Walnut, Kalamazoo 42, Mich.

MAKE \$160.00. Invest \$9.00. Make us prove it. Ezee, Bayport 7, Mich.

WANT To go in business for yourself without capital? We show you how. Postcard brings all details free. Topval, Lindenhurst 220, N. Y.

FORMULAS, PLANS, ETC.

ANY Formula \$5.00. Satisfaction guaranteed. Jack, Chemist, 5138 Gainer, Philadelphia 31.

FREE Formula catalog. Anything analyzed \$35.00. Western Chemical, Salem, Oregon.

FOR Proof of what you can do in specialty manufacturing get our literature. It's free! Miller, Chemist, 1517-P, Tampa, Florida.

FORMULAS; All kinds. Latest, best. Literature free. Kemixal, Park Ridge, Ill.

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PRODUCT Analysis, manufacturing formulas, processes developed. Moderate fees. Plastics, Box 1574, Boston 4, Mass.

FREE Formula list. Anything analyzed. Northwestern Laboratories, 2316 Brown, Evanston, Illinois.

The Best mfg. formulas at any price. A. F. Hanlon, Malvern, Penna.

MANUFACTURE "Battery pep-up battery preparations." Tremendous profits. Formula airmail \$1.00. P. Childers, 216 West Jackson, Chicago 6.

PLASTICS

HIGH Profits—Jewelry, gifts, novelties. Free catalog. Pilot Plastics, 67-C Fulton, New York City 38.

PLEXIGLAS Any size clear sheets, 1/8", \$1.10 square foot. Ultra Plastics Mfg., Pittman 22, N. J.

NEW Liquid casting plastic. Clear, colors. Embed flowers, insects, coins. Saw, drill, carve. Send 25c for "How to Cast With Liquid Plastic" and proved success plan showing how to make money at home. Castolite, Dept. E-101, Woodstock, Illinois.

PLASTICS Home-craft course for men and women. Tells and shows how to make hundreds of fast selling plastics products. All plastics and materials for 23 projects included in course. No special tools needed. Course pays for itself. Write for free booklet. Interstate Training Service, Dept. D-3-E, Portland 13, Oregon.

PLEXIGLAS. Fiberglass, polyester, acetate, vinylite. Fast service. Wholesale-retail. Catalog 15c. Gem-O-Lite, Box 686P, North Hollywood, California.

PLEXIGLAS. Lucite sq. ft. (12"x12") cost 1/16" \$1.14, 1/8" \$1.50, 3/16" \$1.85, 1/4" \$2.20. Add 10% for postage. Almac Plastics, 600 Broadway, New York 12, N. Y.

PLEXIGLAS Sheets—Cut to size. Clear. All thicknesses. Standard outdoor translucent colors. McClarin Plastics, P.O. Box 168H, Hanover, Penna.

LAMINATING Supplies. Free price list. Solomson, 46 Cornhill, Boston 8, Mass.

PLASTIC. Sheets, rods, tubes, etc. Free list. Plastic Supply Co., 2111 Olive Street, St. Louis 3, Mo.

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AMAZING New book of science. Experiments, formulas and catalogue of laboratory supplies. Only 25c. National Scientific Co., Dept. PM-5, 2204 W. North Ave., Chicago 47, Illinois.

NEW Catalog, lists. 25c. Laboratory Sales, Box 161-A, Brighton, Mass.

"FUTURE Chemists of America" teaches chemistry for beginners. All ages. Systematic. Exciting. Absorbing. Practical. First lesson 25c. Parkway Laboratory (sponsor), R #1, McKees Rocks, Penna.

NEW Idea chemical and apparatus outfits for home experimenting, photo-scales, microscopes, chemicals, biologicals and laboratory supplies in small quantities. Catalog 25c. Established 1931. John H. Winn, 124A West 23rd St., New York, N. Y.

CHEMICALS And apparatus for industrial, analytical, and private laboratories. Catalog 25c. Dept. M-50, Biological Supply Co., 1176 Mt. Hope Ave., Rochester 20, N. Y.

ILLUSTRATED Catalog: Chemistry, mineralogy, biology 20c. Tracey Laboratories, Evanston, Illinois.

HAVE You a chemical problem? Write without obligation to Consultant, Evans-ton, Illinois.

AGENTS WANTED

NEW Amazing ball point pen, bar none. Sells 69c. You pay \$3.25 dozen. Whirlwind seller. Red, blue, green ink. Sample 50c. Details free. The Witt Company, Alma, Arkansas.

AGENTS—Salesmen: Sell beautiful hand-colored plastic enlargements and sensational new personalized photo compacts, rings, bracelets, lockets, etc. Experience unnecessary. 40% advance commissions. We deliver, collect. Wonderful sideline. Better full time. Free sample outfit. Novel Portrait Co., 3343 North Ave., Chicago, Ill.

30,000,000 WOMEN Want amazing new automatic refrigerator defroster. You sell 2 out of 10 on sure-fire free trial. \$250.00 weekly profit not uncommon. Rush postcard for guaranteed plan. D-Frost-O-Matic, Dept. H-102, 173 W. Madison St., Chicago 2, Ill.

NEW Plastic mending tape. Just press on! Repairs clothing instantly. Lightning seller. Samples sent on trial. Kristee 71, Akron, Ohio.

BUY Wholesale thousands nationally advertised products at big discount. Free "Wholesale Plan." American Buyers, 629-P Linden, Buffalo, N. Y.

AGENTS—Small tools sell on sight, good profit. Gam Mfg. Co., Box 1116, Lancaster, Penna.

BEAUTIFUL Feather pictures. 200% profit! Free sample. Apartado 9036, Mexico 1, D. F.

MAKE Money introducing world's cutest children's dresses. Big selection, adorable styles. Low prices. Complete display free. Rush name. Harford, Dept. N-6341, Cincinnati 25, Ohio.

YOUR Own business—Used suits \$1.50, overcoats 65c, mackinaws 35c, shoes 12 1/2c, ladies coats 30c, dresses 15c. Enormous profits. Catalog free. Moro, 1218AA South Jefferson, Chicago 7.

EARN Over \$8000 yearly. Many European factories are not yet represented in U.S. Be their agent! State interest. We furnish leads. Airmail service \$2 cash. Haven, Duinroosplantsoen 6, Haarlem-Holland.

NEED More money to live on? Increase your weekly income \$20 to \$25 or more in spare time. Supply Rawleigh Products to consumers. Also openings for full time dealers. Write Rawleigh's, Dept. E-DD-PPM, Freeport, Ill.

BUY Wholesale — 25,000 items. Catalog 25c. Matthews, 1472-BB Broadway, New York City 36.

MANUFACTURER Wants agents; new patented athletic exerciser, equipped with natural rubber bands, of different resistances, detachable spring steel wire handles, resistance from 25 to 200 pounds. Write for free literature, or send \$4 for agent's sample. Roy H. Noe, 739 N. Auburndale, Memphis, Tenn.

MAKE Money giving away free hosiery! Introduce amazing nylon stockings (guaranteed against runs and snags) and men's children's hosiery (guaranteed one year) by giving away free trial pairs regardless whether or not final purchase is made! Earn up to \$3 hour spare time. Mail postcard today for free samples men's and women's hosiery with complete money-making outfits. Nothing to pay now or later. Absolutely no obligation. Kendex, Babylon 53, N. Y.

PHONELOCK. Automatically collects dimes, desk phones. 601 S. Vermont, Los Angeles.

RETRACTABLE Ball point pens, assorted colors, one dozen \$2.95. Sample for 30c, retail for \$1.00. Peter A. Scala, 596 Union Avenue, Brooklyn 11, N. Y.

HIGHLY Profitable magnetic pencils for everyone! Sample \$1.00. Nicholson Products, 3403 Caluenga, Hollywood 26, Calif.

BUY It wholesale. Appliances, cameras, tools. Rush \$1.00 for catalog to Edward Clemens, 318 W. Bridge St., Morrisville, Penna. (Refundable.)

GERMAN Address lists! Anything manufactured, 50c. Burke Associates, Manchester 1, Mass.

TOOLS. Hardware, catalog 25c, refundable. Reed Company, Box 125, New York 32.

MEN, Women, make money spare time plus new car as bonus for encouragement. Amazing hosiery guaranteed to wear without holes, snags, and runs, or replaced free. For example, lovely 60 gauge nylons guaranteed for as long as 14 years, or replaced free. Write Wilknt, 1755 Washington, Greenfield, Ohio.

2 IN 1 Reversible window cornices. Add charm to every room. Feather bird pictures, etc. Specialty Products Co., So. Plainfield, N. J.

SELL Wholesale big-name merchandise. Sales easy because of sizeable discounts. Write A.I.M. Co., Box 2002, Paterson, N. J.

FREE Demonstrator offer. Power mowers. Home agents. Dealers. Terms. Farmco-51, Excelsior Springs, Mo.

AUTOMATIC Needle threaders sell to every home. Sample \$1.00. Details free. Superior Products, Box 12, Berlin, Wis.

WHOLESALE! 12,000 Nationally famous products. 30-80% discounts! "Wholesale trade secrets" catalog. Sensational business plans free. Derrom Company, 21-10 White, Paterson 23, New Jersey.

PROFITS Unlimited! Start a wholesale buying service! Sell 10,000 nationally advertised products at big discounts! Free details! National Buyers Service, Box 426ED, Oakland, California.

MAKE \$30 Daily. Automatic toilet cleaner sells itself! Box 61, Belleville, N. J. Sample, \$2.35.

EASY Money selling the new Pro Candid 35 mm. cameras. Your area is open for anyone to cash in on these fast-selling cameras. Selling kits furnished, cash commissions guaranteed. For complete information write Bearline Industries Inc., 500 N. Robert Street, St. Paul 1, Minn.

CHROME Plating. New profitable method! Complete outfit \$2.00. Good Housekeeping guarantee. Agents wanted. Dutch, 51, Monkhams Lane, Woodford, Essex, England.

NEW Way to make money! Sell nothing. Yet make \$132 or more weekly! Postcard brings all details free. Topval, Lindenhurst 219, N. Y.

HAVE Your own business, buy wholesale. Make big profits. Free general mdse. catalog. Ray Norris, Dept. P, 445 Broome St., New York.

WEDDING Invitations, personalized napkins. Wholesale prices. Sperry-Print, Williamsport 45, Penna.

THOUSANDS Articles wholesale. Supply source directory 10c. Idealer, Park Ridge, Illinois.

CALIFORNIA Sweet smelling beads. Sensational sellers. Particulars free. Mission, 2526 FR, W. Pico, Los Angeles 6, Calif.

PRINTING, Advertising salesmen—Excellent money-making sideline. Selling decamania name plates, small quantities. Automobile initials, sign letters. Free samples. Ralco, XL, Boston 19, Mass.

GOLD Or silver letters, numbers. Windows, doors, trucks. 1" to 6". 500% profits. Free samples. Atlas-T, 544 West 79th, Chicago 20.

MAKE Extra money. Sell front door name plates to friends, neighbors. Retail \$1.98; you make \$1.00! Free selling kit. Modern Engraving Co., P.O. Box 194, Boston 14, Mass.

\$1.00 PROFIT Selling \$2.95 photo enlargement deal. Allen Studio, Riegler Bldg., Little Rock, Ark.

AGENTS—300% Profit selling genuine goods. Windows, stores and offices. Free samples. Metallic Sign Letter Co., 431-D North Clark, Chicago.

INCREASE Your income—Personal initialed buckles, caps, badges. Free information. Hook-Fast, Box 480 (PM), Roanoke, Va.

BARGAINS, Joblots, close-outs. 2000 items. Save to 50%. Clothing, hosiery, toys, toiletries, gifts, jewelry, television, etc. Get acquainted. 25c brings wholesale catalog plus free \$1.00 merchandise certificate. Reliable Jobbing, 311-B North Desplaines, Chicago.

CASH In on toilet trouble—Sell plastic flush valve guide. Write for sales plan. Guide-O-Valve Co., 1616 Broadway, Redwood City, Calif.

\$70.00 WEEK Spare time! Sell Protocone protective hand cream. Protects hands like rubber gloves! Terrific repeater! Free information! Burnie Laboratories, 1818P West Haskell, Tulsa 7, Oklahoma.

WHOLESALE Catalogue! Appliances, cameras, watches! Cam Company, 6806 20th Ave., Brooklyn 4, N. Y.

60% PROFIT On cosmetics—Famous nationally advertised Hollywood Cosmetics pay 60%! Make \$25 day up! Hire others. For free samples, details, write Studio Girl, Glendale, Calif., Dept. PM-45.

YOUR AD in this space will get some good agents for you. Yes, I'll prove it. Write for Folder "A" right now. F. W. Johnson, Classified Advertising Manager, Popular Mechanics Magazine, 200 E. Ontario St., Chicago 11, Ill.

SALESMEN—DISTRIBUTORS

SELL Advertising specialties and executive gifts for old established firm. Good thing for man with wide acquaintance among business firms. Opportunity for hustler who likes to make money and isn't afraid to make calls. Develop your own business with no investment. Leads given. Best selling season now on. Write today. Newton Mfg. Co., Dept. GR-1, Newton, Iowa.

AD Matches! Sell amazing designs—10, 20, 30, 40 and 240-light book matches. Bigger spot cash commissions! Every business prospect. Low prices for high quality. Repeats. Start without experience; men, women; full, part time. Buy nothing! Sales kit furnished. Match Corp., Dept. PM-65, Chicago 32, Illinois.

BIG Money-making opportunity. Exclusive line work uniforms. Jackets, pants, shirts, coveralls. Advertising embroidered. Every business prospect. Outfit free. Master Div., 315 Water, Ligonier, Ind.

GET New shirt outfit free; make \$90.00 weekly on 5 average orders a day. Famous quality made-to-measure dress and sport shirts at \$3.95 up sell fast to all men. No experience needed. Full or part time. Write Packard Shirt Co., Dept. 894, Terre Haute, Ind.

GOOD Man can make \$3,000.00 next 90 days. Every house in town wants amazing Nilite glowing curbside house numbers. Automatic selling plan pays profits every day. Write today for details free. Nilite, 173 W. Madison, Dept. H-80, Chicago.

ALUMINUM Outdoor furniture. Sell direct to homes. Samples at cost from manufacturer. Good profits. Weco, Port Huron, Michigan.

AMERICA'S Lowest priced all leather work glove. Sell stores and factories. Volume! Mailorder repeats! Briggs Co., PM Gorham Bldg., Minneapolis 3, Minn.

SALESMAN. Immediate opening. Large national organization. \$7500 to \$10,000. Write, wire, Utility, 330 South Dearborn, Dept. PM-5, Chicago.

CALENDARS. Advertising novelties, matches. All styles, including religious, varnished, 12 sheet, girls. Hundreds of advertising novelties, book matches, etc. Fleming Calendar Co., Sales Division, 6539 Cottage Grove, Chicago 37, Ill.

BUY Wholesale thousands nationally advertised products at big discount. Free "Wholesale Plan." American Buyers, 630-D Linden, Buffalo, N. Y.

SPECIALTY Distributors needed—Revolutionary fish lure development. generous profit every sale. Heavy repeat item. Regular service brings top income. Tremendous market. Year-round sales appeal. Nationally advertised. Small investment for original stock. Write, complete details. Landon Laboratories, 117 W. 67th Terrace, Dept. 22, Kansas City 5, Missouri.

AGENTS, Salesmen, buy standard brand merchandise at rockbottom wholesale prices: \$49.50 watches at \$22.95, \$49.50 dinner sets at \$15.60, \$1.00 ladies' first quality nylon hose at \$0.50 per dozen. Ladies' closeout \$8-\$10 fall and winter dresses at \$1.50. Other sensational values in clothing, silverware, jewelry and appliances. Minimum order \$10.00. Send \$1.00 for catalog with confidential price list. Refundable first order. Merchandise Dept. P-5, P.O. Box 66, Bronx 59, New York.

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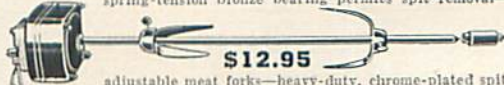
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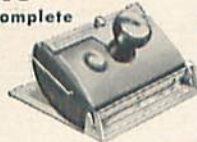
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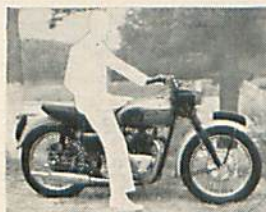
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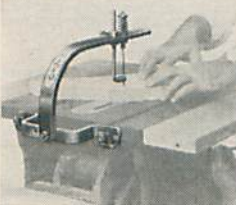
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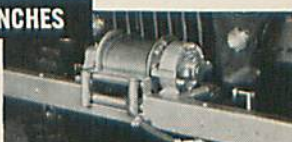
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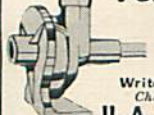
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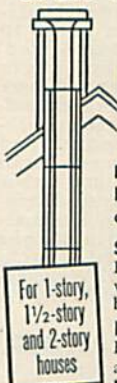


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Perfume May Lure Fish To New Spawning Grounds

Underwater perfume may some day be used to lure fish, particularly salmon, to desirable new spawning grounds. Water pollution, power dams and irrigation projects today increase the need for a means of fish diversion. The fish could be conditioned to an artificial odor during hatchery rearing. Years later, when they return from the ocean, the odor could be introduced into a desired stream location and the fish would follow the scent and spawn there. The decoying method was developed by Dr. Arthur D. Hasler and Warren J. Wisby of the University of Wisconsin. The scientists, who assigned rights of the patent to the Navy Department, believe artificial scent may also prove useful in getting fish away from a given area where they are interfering with sonar contact between a ship and an underwater target.

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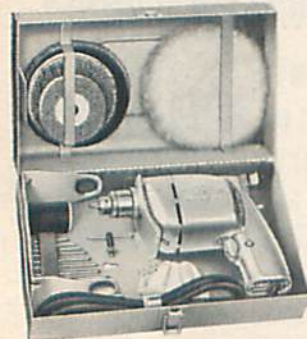
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DRILL KIT in roomy all-steel carrying case



Includes Drillmaster, set of 10 drill bits, 6 sanding discs, rubber backing pad, wire brush wheel, buffing wheel, polishing bonnet and compound, bench stand and arbor adapter set. Kit including Drillmaster with Jacobs Geared Chuck, \$39.95. With keyless chuck, \$36.95.

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Reading time: 3 minutes to learn how to

- cut engine wear up to 38%
- prevent loss of power, compression
- save 15%-25% on oil... without ever changing your oil filter

This Gadget is Worth \$320,000,000

...and I Discovered it by Accident!

by Albert Wells

IT ALL STARTED the day I got the bill: \$214.36 for an engine overhaul—and I had only 28,000 miles on the car!

I told my troubles to a neighbor—a lubrication engineer—told him how I'd always changed oil every 1500 miles, changed filters every 5,000 miles. His answer floored me.

"You've been wasting your money," he said. "We've spent millions developing oil additives that keep carbon, gum and abrasives from damaging your engine. Your oil costs about 15¢ more a quart because of those additives. Yet, some of the cloth or paper filter packs you've been buying actually remove oil additives. And the more often you change filter packs, the more money it costs you."

"But don't I need a filter to take the impurities out of the oil?" I asked.

He took a deep breath. "This will really shock you. Engine damage is done by abrasives 10 to 40 microns in size (a micron is .000039"). Your oil filter can't take them out because cloth or paper can't be packed tight enough without stopping oil flow when the fibers soak up oil and expand."

"What kind of oil filter do you recommend, then?"

He laughed. "Well, there's a porous bronze filter they're using in supersonic aircraft that does a perfect job. But you can't get one like that for your car."

I asked myself: "Why not?" Next day, I tracked down the outfit that was making the filters for aircraft, and got the answer. These porous bronze filters were made by fusing together millions of tiny bronze balls. Non-absorbent, they didn't remove additives, yet they removed abrasives in the 10-to-40 micron danger zone. Could they be made for automobiles? Again, the answer floored me.

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A dealer and distributor network is now being formed to handle demand generated by advertising and editorial features in national magazines. If you can qualify, you can be first with the most exciting automotive product of this decade, to win new customers and build a substantial business. These valued franchises are not being sold; they are awarded on the basis of ability to grow with us. For complete details, write or wire: Continental Manufacturing Corporation, Dept. FPM-5, Washington Blvd. & Motor Avenue, Culver City, Calif.

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LIFETIME FILTER TESTED IN CARS, TRUCKS, BOATS

Test models had already been used in cars and trucks for millions of miles, proving the porous bronze filter: 1. Never needs replacing. 2. Saves the quart of oil thrown away with ordinary filter packs. 3. Increases engine life.

Trouble was, almost the entire production was being absorbed by military and industrial users.

That day I went to work on the biggest job of my life: setting up production of the Lifetime porous bronze permanent filters for cars and trucks (an estimated \$320,000,000 replacement industry).

HOW TO GET A LIFETIME FILTER FOR YOUR CAR

Try the Lifetime filter on your car for 2 weeks: if it isn't all I say, you get your money back; if you keep it, you're through buying filter packs—the Lifetime filter is guaranteed for 10 years, actually will last many times that long.

For complete unit, including case and fittings (install on any car in 10 minutes), send make, year and model of your car and \$12.95 (we pay shipping).

For conversion kit, which replaces your present filter pack with Lifetime bronze, send make and number of filter and \$6.95 (we pay shipping).

Or send only \$2 deposit, pay C.O.D. charges on arrival. But do it today—don't waste another cent on filter pack replacements!



Complete Lifetime Filter; fits any car.



Lifetime Conversion Kit; replaces ordinary packs with permanent bronze element.

Permanent Filter Division, Dept. FPM-5
CONTINENTAL MANUFACTURING CORP.
Washington Blvd. at Motor Ave., Culver City, Calif.

Ship ☐ complete unit ☐ conversion kit

Make, model, year of car: _____

Present filter make (if known) _____

I enclose ☐ \$12.95 for complete unit (\$18.95—chrome)

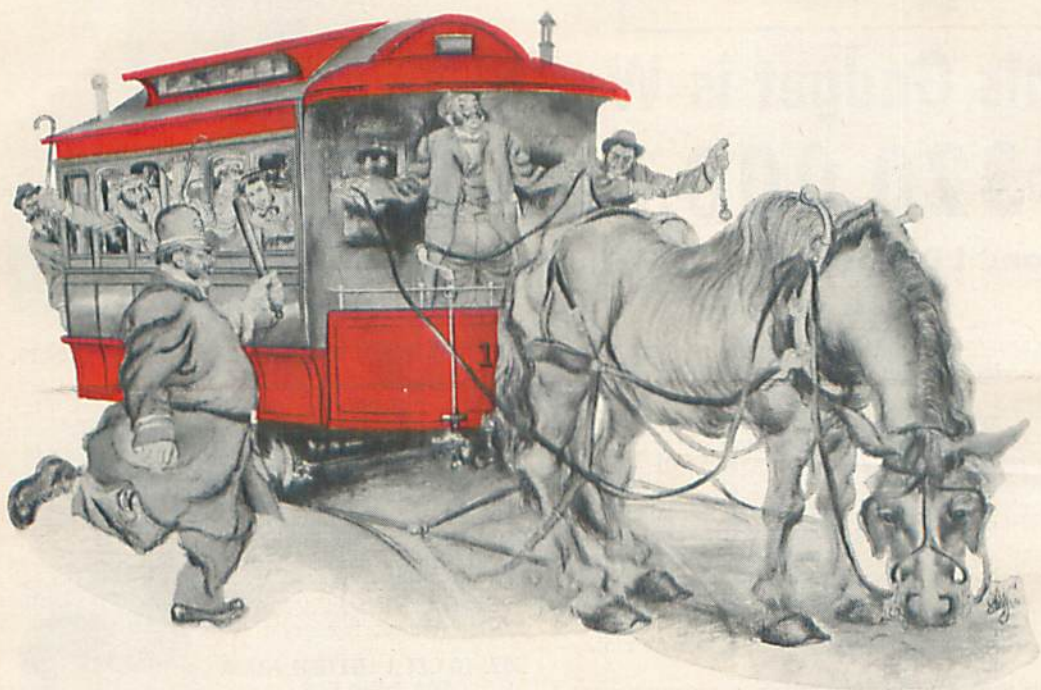
☐ \$6.95 for conversion kit

☐ \$2.00 deposit; send C.O.D.

Name _____

Address _____

City _____ Zone _____ State _____



CARS, TRUCKS AND TRACTORS CAN LOSE THEIR HORSEPOWER, TOO!

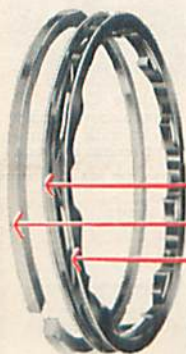
Lost horsepower is costly and aggravating! Loss of power means poor performance under load...excessive oil and fuel consumption.

No need for *any* of this! There *is* an effective modern remedy!

The Perfect Circle 2-in-1 Chrome piston ring set will restore lost horsepower...assure positive oil control and sustained power for over *twice*

as long as old style piston rings. Your equipment will again operate under full load and adverse conditions...with *full power*!

Install Perfect Circle 2-in-1 Chrome piston rings now. For car, truck or tractor, the results are the same... *restored horsepower* and positive oil control! Perfect Circle Corporation, Hagerstown, Indiana; The Perfect Circle Co., Ltd., Toronto, Ontario.



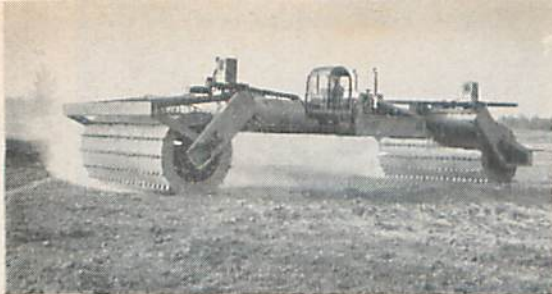
Solid chrome plating on *both* top and bottom rings gives complete wear protection throughout entire area of ring travel. Rings are lapped-in at factory, making tedious break-in unnecessary.



Perfect Circle

2 in 1 chrome piston rings

The Standard of Comparison



POPULAR MECHANICS

MAY
1955

WRITTEN SO YOU CAN UNDERSTAND IT
VOL. 103 NO. 5

With his Gargantuan machines
Robert G. LeTourneau can pick up a house or mow down a forest

He's Changing the Face of the Earth

By Paul Lee

THE RED DUST near Longview, Tex., billows out in pink clouds as a monster lumbers up to a wood lot, digs in and in one shuddering effort pushes over a huge tree, root system and all. Nearby, another machine rolls through the grove, knocking over trees and smashing them to pulpwood.

These are just two samples of a new breed of mechanical monsters—land-clearing machines—designed to clean up the face of the earth. They bear the name LeTourneau—a name that has been synonymous

Tree roller, shown here and at top of page, climbs trees until they topple, then grinds them to pulp





Tournatrail has short turning radius but is longer than a football field. Left, huge cab has seats for crew of seven. Bottom, ingenious linkage makes all cars follow same path during a 90-degree turn

with earthmoving for decades. More than half the earthmoving equipment in the world was designed by Robert G. LeTourneau and built in his factories.

Suddenly, about a year ago, LeTourneau sold his entire earthmoving business for \$31,000,000 and, at the nominal retirement age of 65, embarked on a brand-new crusade—land clearing.

Why?

To discover the answer you must turn to the man himself. LeTourneau is much like the machines he builds: big, awkward, but unbelievably efficient. When he pushes, something gives, and he can race through an impressive amount of work between 7 a.m. when he bursts into action and 10 p.m. when he seems to switch off his energy for a few hours.

LeTourneau never finished high school, yet he is an outstanding engineer and inventor. For proof, take a look at his machines, which now churn through mud and swamp the world over.

To LeTourneau, the curtain is going up on a big-business drama. The millions in the cast include a baby crying for food, a farmer in Peru and your own grandchild.



Tournalayer totes a steel form containing a concrete house from the casting site to a prepared foundation

The stage setting for this drama can best be expressed in figures. By the time you reach the end of this article there will be 85 more mouths to feed in this country. Tomorrow our population will have increased by 6000, and a year from today 2,000,000 more people will be sitting down to the dinner table.

Despite this population boom, we have fewer acres of farm land than we had 30 years ago. For every acre we add for food production, we lose more than an acre to expanding cities and superhighways. Sometime before 1975, according to a recent survey, our ascending population curve will intersect the line showing our

production of food and fiber. At that moment we'll step from surpluses to shortages.

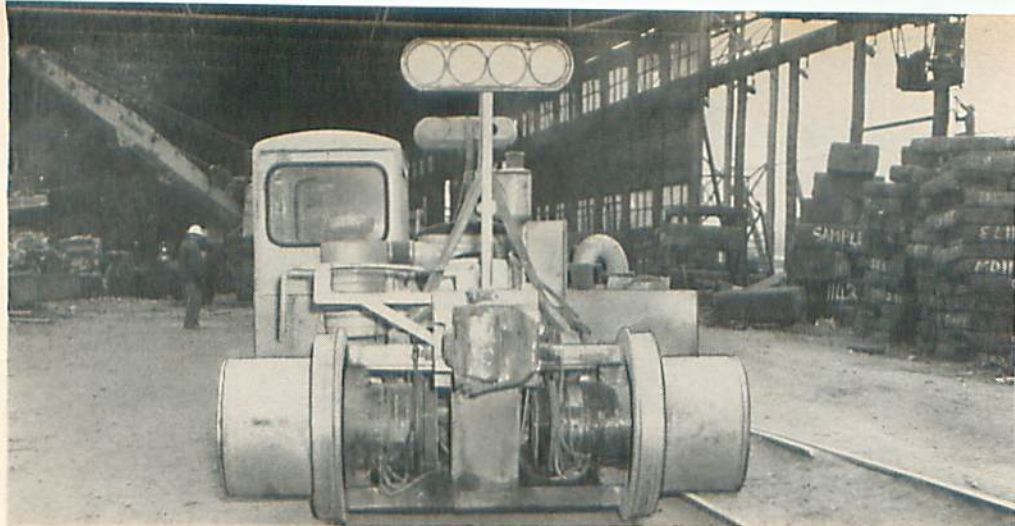
How will our children, our grandchildren fill their dinner plates?

Several answers have been proposed: Increased use of machines and fertilizers, new sources of food from the ocean, higher yields through hybrids.

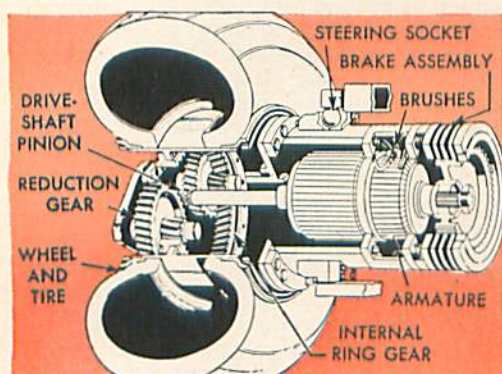
But the short-term answer is simply to increase the number of acres under cultivation. In this country there are 50 or 60 million acres of fertile land covered by unproductive trees and brush. And more important, an umbrella of rain forest covers billions of acres of potentially good farm land in Africa and South America.

U-shaped Tournalayer also can pick up an existing building weighing 150 tons and move it to new location





Even the switch engine used in the LeTourneau steel mill is equipped with an electric motor on each wheel



Motor in each hub gives machines flexible power. If three wheels are stuck, fourth draws all the power

Against this backdrop, the drama is simply the age-old story of man against nature. But the tools man will be using are something new on the face of the earth which they are destined to change. Surprisingly few machines have ever been designed specifically for land clearance. Most of our present farm land was cleared by ax blade and blister. Recently a few earthmoving machines such as bulldozers have been adapted for land clearance.

Now a new technology is unfolding. Several firms are designing 20th-century versions of the colonial farmer's ax. The strangest, biggest and perhaps the most efficient machines have been born on the

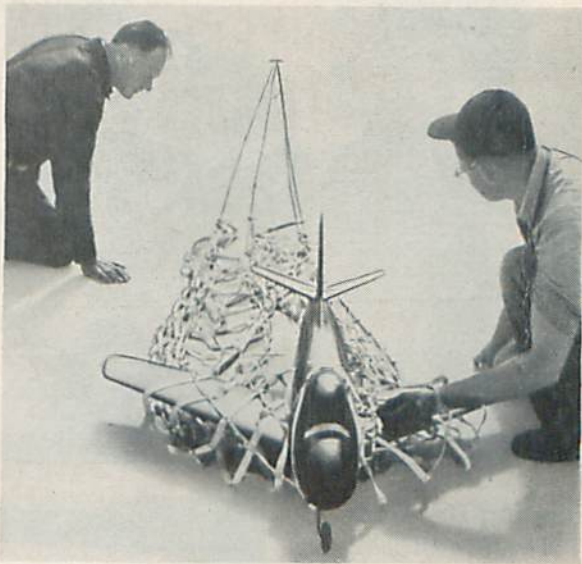
(Continued to page 238)

Sno-Buggy, posed in front of LeTourneau-designed building, has eight 10-foot tires that "float" it on snow



Model Jets Reach Speed of Full-Size Planes in Barrier Tests

Stretchable nylon barriers designed to halt jet aircraft overrunning normal runways are tested with scale-model planes that approximate the landing speeds of their big brothers. The tests, conducted by All American Engineering Company, at its Georgetown, Del., test base, are intended to eliminate basic planning defects before full-sized nets and planes are used. In the tests everything is scaled down to one-tenth size except the ground speed of the planes. The tiny models of F-86 and F-89 fighters crash into a scaled-down nylon net and are brought to safe halts. But the speeds attained by the models—126 miles per hour—approach the landing speeds of the big fighter aircraft, imposing greater than scale loads on the nylon barriers.



Helicopter Sites Antenna

Television reception is tricky in mountainous country, and the transmitting antenna must be carefully placed to obtain the widest coverage. With this in mind, German engineers employed a helicopter in the wooded Harz Mountains. First, receivers were spotted through the potential area of the station. Then a short mast was attached to a helicopter and signals were beamed from various altitudes and locations. Best reception determined the location of the mast and its height.

Shot Grinds Hole in Road

Irregular, sharp pieces of steel shot, trapped under whirling steel tubing, make up the cutting edges of a concrete drill used to test highways. The drill is mounted in the back of a truck, with the tubing attached, and is lowered to the pavement through a hole in a board. The shot in the hole catches in slots in the tubing and gives it a cutting edge. A 5-inch core of 10-inch concrete can be cut in 15 minutes.

Capable of operating in a temperature range from minus 100 to over 400 degrees is a new silicone lubricant developed by General Electric for jet aviation and industrial applications.





Home-Movie Editor Acts as Projector

Designed primarily for editing of home movies, a new viewer has a ground-glass screen that is large and bright enough to serve as a tabletop projector for film showings. The viewer is geared for normal, high-speed and slow-motion operation. It can be reversed and stopped at any desired frame for editing, and its brightness makes daylight operation possible, eliminating the necessity of darkened rooms.

Floating Dry Dock

Boats 65 feet long and weighing 130 tons can be repaired in a floating dry dock a Canadian firm has made from a United States landing craft. John Manley Ltd., of New Westminster, B. C., bought the 125-foot craft in Seattle and towed it to the firm's shipyard on the Fraser River. There welders cut off the stern and installed air tanks. The decks were cleared away and a concrete floor poured. The cleared area provided a dry-dock area of 23 feet by 96 feet with a draft lift of 8 feet. As soon as the tank valves are opened, the dry dock sinks rapidly. The boat or boats to be repaired

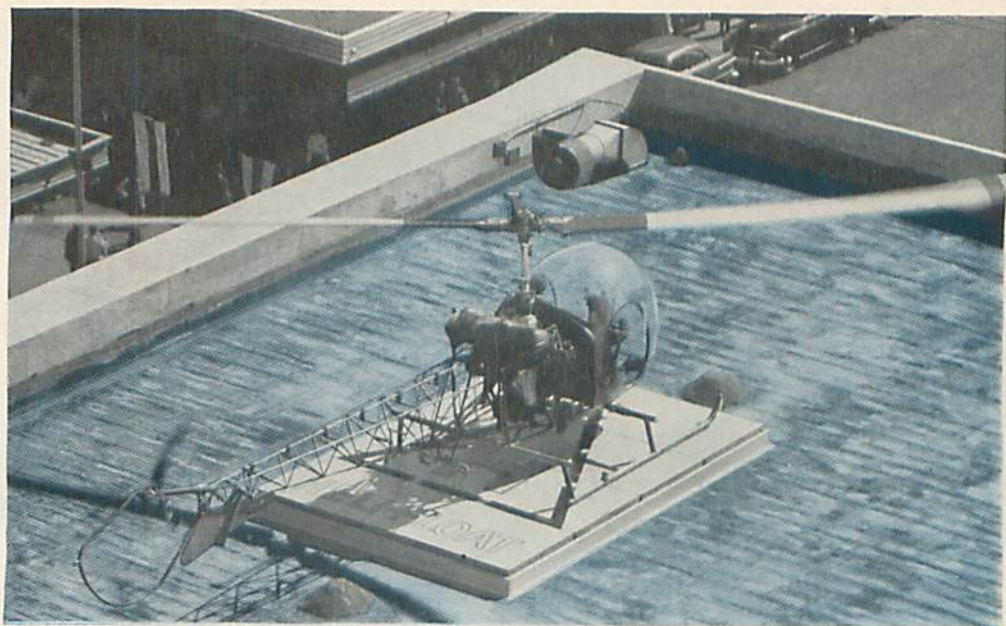


are towed in. Air is forced into the tanks and the inexpensive dock is high and dry in 10 minutes.



"Phantom" Auto Displays Interior

Like an artist's phantom drawing, a French Peugeot 203 show car provides an unhindered view of the interior while tubing outlines the exterior. The tubing follows the exact shape of the body, including headlights and bumper guards. The Peugeot, incidentally, has reclining seats that can be made into a bed. The car's four-cylinder engine develops 90 horsepower.



Floating Roof-Top Platform Serves as Helicopter Landing Strip

Roof-top landings by helicopters are aided by a new landing platform that uses a water cushion to distribute the thrust and weight of the landing aircraft over a wide area. The landing pad, of aluminum honeycomb construction, weighs but five pounds

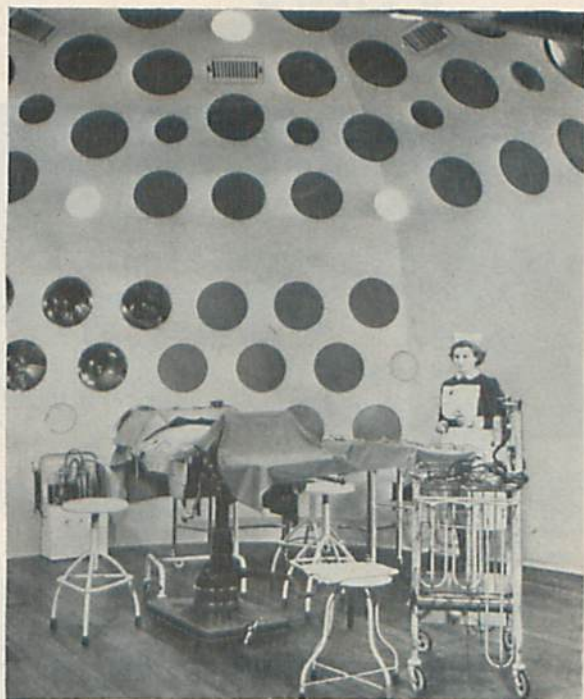
to the square foot, and floats on two to four inches of water. Its makers say the helifloat will allow helicopter operations on almost any flat roof without the need of building reinforcement, and that the water absorbs operational noise.

"Igloo" Operating Room Gives Unobstructed View

Over 100 portholes in the sides of an igloolike operating theater give medical students an unobstructed view of operations. Most of the round windows can also be used to direct lights toward the operating table. In the ceiling of the British-designed theater are six vents which pump down warm, purified air, forcing germs to floor level where they exit through ventilators. The room can be sterilized and ready for use again in 20 minutes.

Jap Balloon in Alaska

Spotted by a bush pilot and recovered with considerable difficulty by helicopter, a Japanese bomb balloon sent aloft more than 10 years ago has been found in the Yukon area of Alaska. The balloon itself measured about 32 feet in diameter and was made of rice paper so tough that two men could not pull it apart.





It takes 48 hours to put up the big stage. Hydraulic-lift mechanism is built into vertical post in center

FLYING-SAUCEUR STAGE

GENERAL MOTORS produces more cars than any other company in the world (1954 production: 3,000,000 cars). It also produces the world's best-attended stage show (1955 attendance: 2,000,000).

The show (a 30-minute glorification of GM cars, spiced with music, acrobats and

One of the five stars, Pontiac, is pushed into position atop the turntable at the end of a cantilevered arm





Low area is the water pool. Each car swings down and across to leave the stage behind the ladders at left

a smattering of culture in the petite form of a French ballerina) is part of General Motors' annual Motorama.

This year, GM cars break through the curtain 13 feet above the floor, and swoop down like sea gulls across a shimmering pool of water, spinning on huge turntables

as they descend to exit beneath the elevated orchestra "pit."

To make gymnasts of five 4000-pound automobiles, GM stylists designed a "flying saucer" stage, so big it takes eight trucks to haul it from city to city, so complex it takes 48 hours to assemble. ★ ★ ★

The orchestra "pit" is high above the stage. A 1955 Chevrolet is coming through the curtain to start the show



Camera Atop Parked Auto Catches Speeders With a Photograph



Mounted on the roof of a car parked beside the highway, a small camera photographs the rear license plate of any car that goes past at a speed in excess of the legal limit. Two strips of tape are stretched across the pavement opposite the parked car. As each passing car runs over the two tapes, its speed is automatically computed and, if it is above the legal limit, another automatic device sets off a stroboscopic flash lamp, exposing the film in a 35-millimeter camera atop parked car.

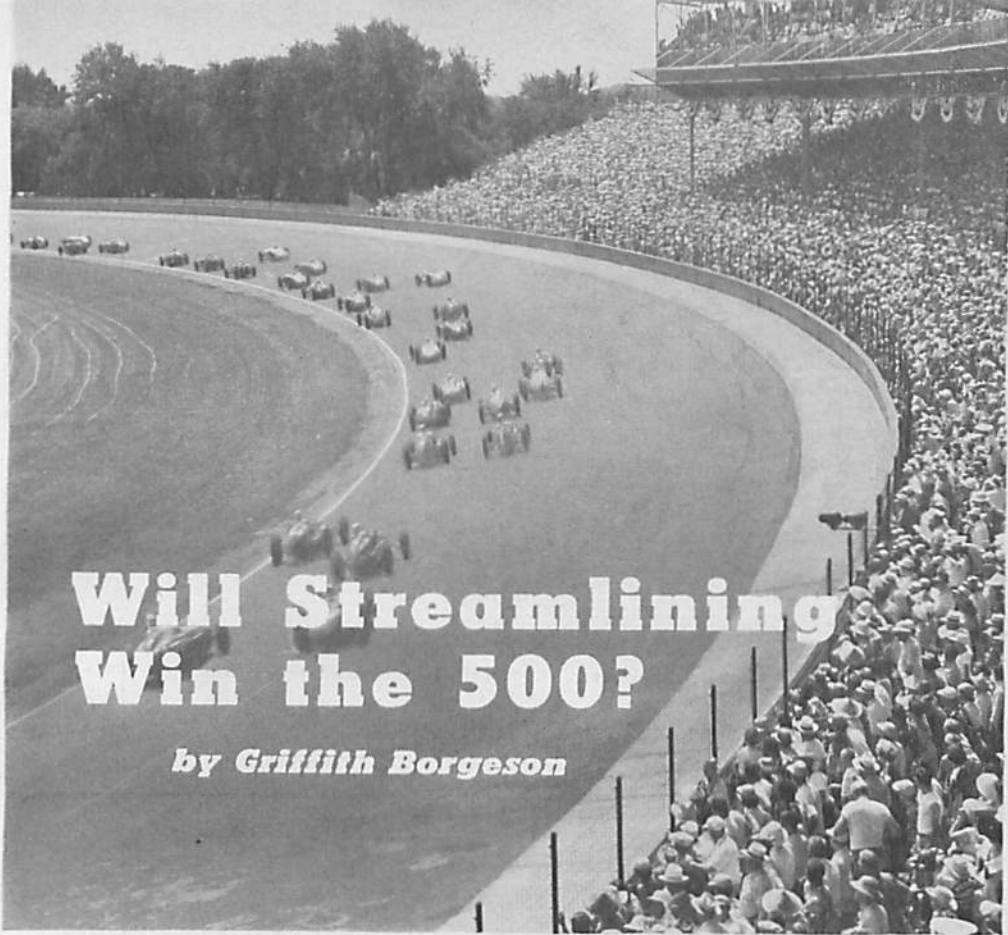
Ford Tractor's Power Is Boosted 30 Percent

Boasting 30 percent more power, the Ford 800-series tractor easily pulls three plows. Extra traction for heavy going can be provided by the use of segmented weights which are simply bolted to the rear wheels. The hydraulic system has been improved so all lines are fully enclosed, eliminating possibility of damage from stones. Ford also makes a 600 series. Combined, the two series offer five different tractors, a break with tradition for the Ford Company which has always concentrated on producing single models.



"Car" Cleans Barn

Nimble enough to turn around in its own length, a homemade barn-cleaner makes use of a shortened Model A Ford. C. R. Flieger of South Dakota cut the Ford in half just behind the transmission, attached the rear end backwards (thus the front wheels were once the rear wheels), and hooked them together with a chain. The front wheels do the pulling and the steering is done with the brakes. A scoop on the front is operated by a hydraulic lift. The pump for the lift is powered by the fan belt.



Will Streamlining Win the 500?

by Griffith Borgeson

WHEN THE SMOKE cleared away after last year's Indianapolis 500, one newsman said sourly, "What did it prove? Nothing. Except who was the best driver—or the luckiest. What else can you prove when all the cars are the same?"

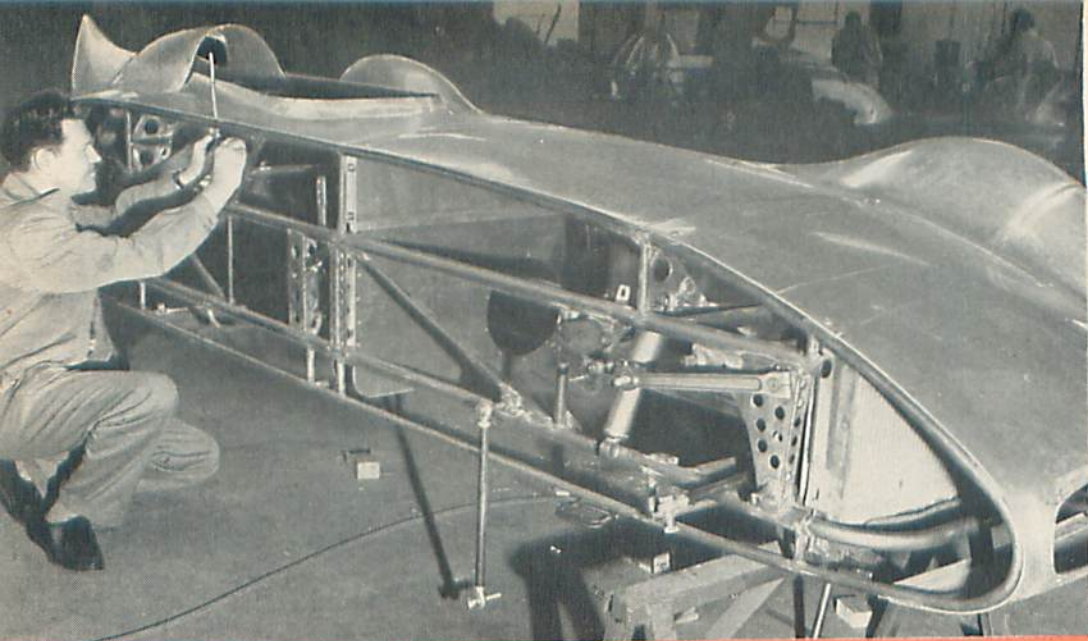
He had a point. The cars looked alike and performed alike. All had similar, conventional bodies, and every one of the 33 starters was powered by the same engine, a 270-cubic-inch Offenhauser.

But this year the situation may be different. The 1955 Memorial Day classic may have the most mechanical innovations in years. There will be new and radically streamlined bodies, a small-displacement Offenhauser engine equipped with supercharger and fuel injection, modified stock-car engines, a car with two-way radio equipment for pit-driver contact, five new Kurtis roadsters, one of which will be powered by an Italian Ferrari engine, and an improved Novi. This year's race should prove a lot.

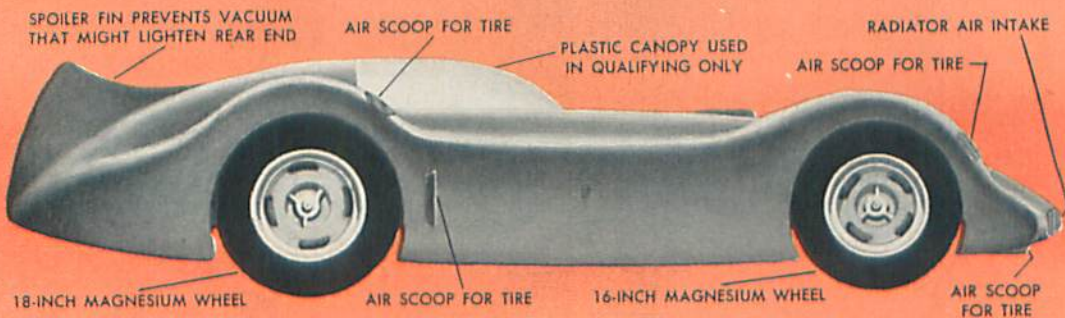
One point it should settle pretty firmly is a question the bench-racers have been arguing for years: Can full streamlining pay off at the Speedway? Frank Kurtis, the largest producer of championship chas-

sis in the United States, is going all out this year to find the answer. Financed by Coca-Cola heir Chapman Root, Kurtis has built a spectacular car that wrings dry the textbooks on aerodynamics. It is the first car in Speedway history to have enclosed wheels, a big rear fin, and lines designed to produce the most perfect possible air flow. For picking up the last shreds of speed in the time trials, it has a Lucite canopy that will fully enclose the cockpit and eliminate that hotspot of air turbulence. The canopy will not be used in the race itself because exhaust smoke from other cars would coat the plastic with dirt and oil, interfering with driver vision. Wind resistance will be minimized in the car's interior, too, by skillful ducting of cooling air through tunnels in the car's skin. The Kurtis streamliner's power will come from a standard Offy 270. The exhaust pipe will run along the top of the body in a deep groove so its heat will not radiate to the rear tires.

Another Indianapolis car designed to cash in on whatever benefits unusual streamlining can give is the Belond-Miracle Power Special. The aluminum body of this machine is as wide as the wheels. It hugs



Frank Kurtis, famed racing-car builder, inspects the partially built streamliner that may make 500 history



BODY DESIGNED FOR MINIMUM PRESSURE ON TIRES AND AT SAME TIME TO AVOID LIFT

Above, drawing shows how the Kurtis streamliner will look when finished. Canopy is not used during race

Another view of the Kurtis streamliner shows trough for exhaust pipe (arrow). Streamlining is expected to boost lap speeds by almost three miles per hour



the wheels, guiding the air past them, but doesn't enclose them. Like the Kurtis, this car has a plastic cockpit canopy that will be used during time trials. A leading electronics manufacturer has developed a super-compact two-way radio that will enable driver Jim Rathman to maintain constant contact with his pit. The chassis for the car is a Kurtis-Kraft and the engine an Offy 270.

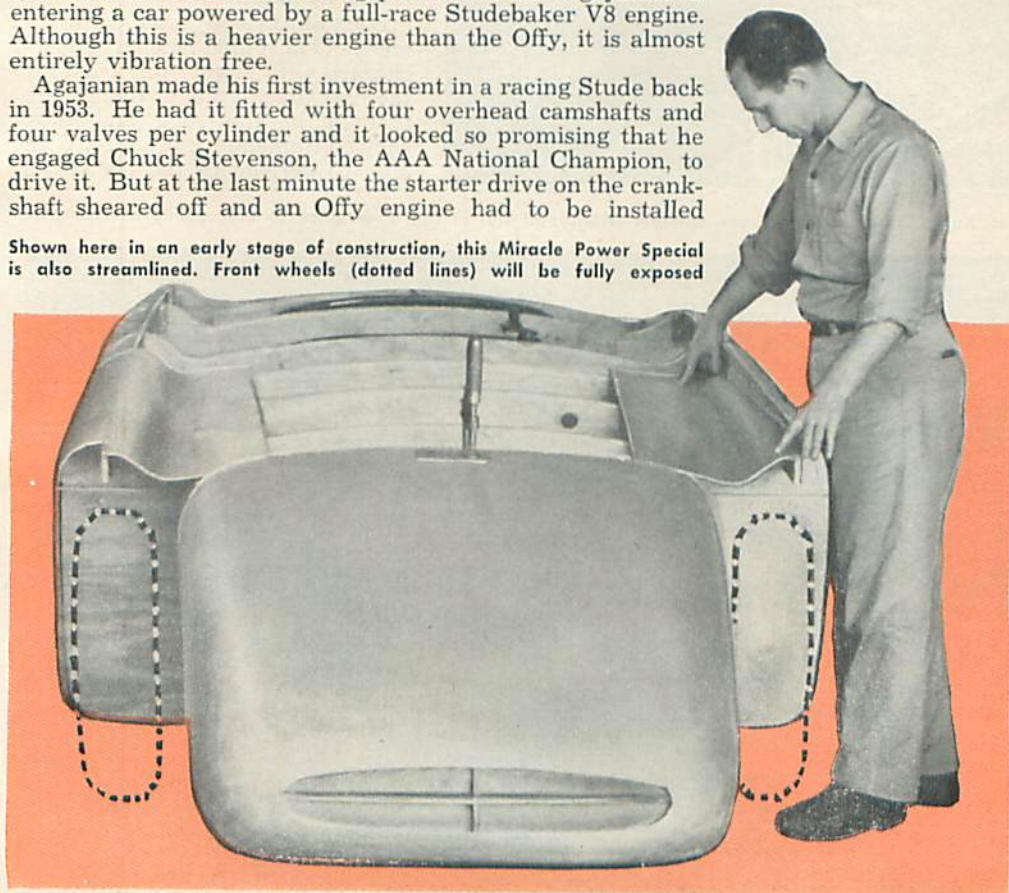
In spite of their radical streamlining, neither of these cars is, you'll notice, straying from the rugged Offy engine. The 270-inch Offy has been the standard work horse of the Speedway for years and few entrants have experimented with other power plants just because the Offy does its job superbly. It does, however, have a few drawbacks. One of them is that it has just four hard-hammering cylinders and therefore at high speeds it vibrates only slightly less than a pneumatic drill. Vibration is an important factor in driver fatigue and fatigue has lost more than one first place in the long, grueling 500. With this in mind, racing promoter J. C. Agajanian is entering a car powered by a full-race Studebaker V8 engine. Although this is a heavier engine than the Offy, it is almost entirely vibration free.

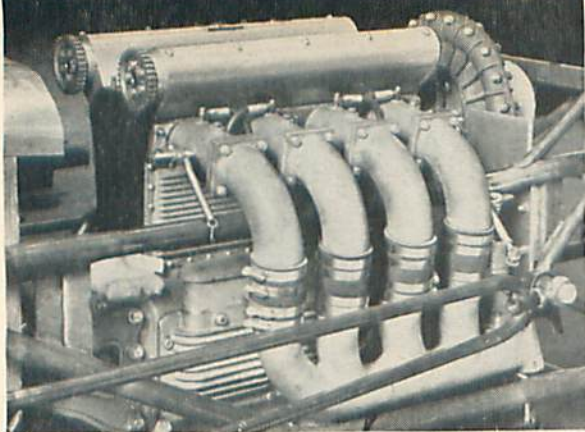
Agajanian made his first investment in a racing Stude back in 1953. He had it fitted with four overhead camshafts and four valves per cylinder and it looked so promising that he engaged Chuck Stevenson, the AAA National Champion, to drive it. But at the last minute the starter drive on the crankshaft sheared off and an Offy engine had to be installed

Shown here in an early stage of construction, this Miracle Power Special is also streamlined. Front wheels (dotted lines) will be fully exposed

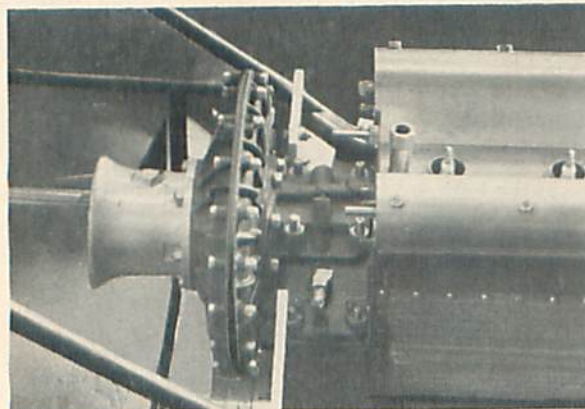


So small it fits in fairing behind cockpit, this two-way radio keeps driver in contact with his pit during the race. Headphones are in the helmet; microphone is in throat strap

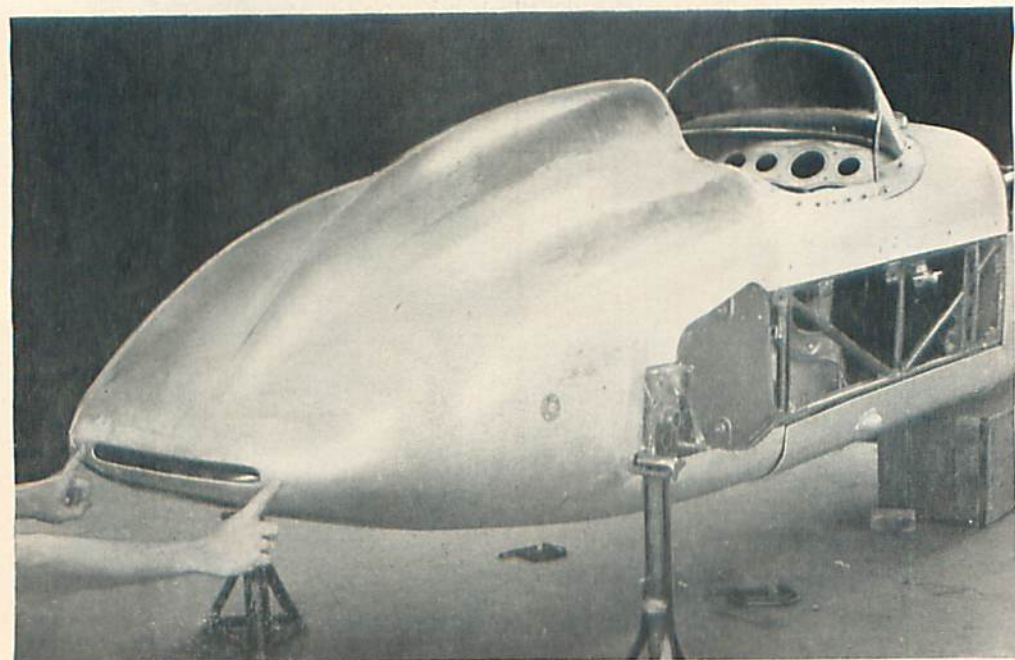




Above, called the small Offy, this 175-cubic-inch engine will be supercharged this year and its 550 horsepower make it a serious threat to its big brother. Below, supercharger housing of the small Offy, which also has a fuel-injection system



Five Kurtis 500-D roadsters are entered. Horizontal slot in tail is designed to aid cooling of rear axle



instead. This year the Stude, considerably improved and developing a beefy 400 horsepower, will run with Duane Carter as its pilot. Willie Utzman, a former Agajanian mechanic, has entered a car with an identical engine.

Still another production-engine experiment is being made by Tony Capanna, one of the leading specialists in wild, weird, high-performance fuels. His Indianapolis entry will have a 270-cubic-inch Dodge V8 engine with Hilborn fuel injectors and stock rocker arms. With a power plant that equals the Offy's weight but produces about 30 fewer horsepower, Capanna has no serious hopes of winning. But he does count on top reliability from his modified stock engine and expects it to make an excellent showing.

Whether any of these souped-up stocks will succeed in giving the 270 Offys a bad time remains to be seen. Even if they do, Offy itself has an ace in the hole.

Back in 1950 a small-displacement (175 cubic inch), supercharged Offy engine was tried for the first time. Four of them were entered in the race and they showed tremendous promise. With only 65 percent of the big Offy's

displacement, they were far more powerful—while they ran. But year after year their carburetion problems have been more than the best mechanics in the game could solve.

Still there were a few die-hards who were convinced that the combination could be cracked. Two of them were Stuart Hilborn, the country's top designer of fuel-injection systems, and Herb Porter, an expert on supercharged engines. Right after last year's race they spent a month modifying and testing a car with the little Offy engine. By making the supercharger blow into fuel injectors mounted right against the cylinders, instead of having it suck fuel and air from remotely mounted carburetors, they feel that they have put an end to the troubles that have plagued small supercharged Offys in the past. What's more, although this engine boasts only a shade more displacement than a Willys six, it now pulls 550 horsepower on the dynamometer as compared with the big unblown Offy's 340.

Any of these experiments—streamlining the body, beefing up a stock engine, or supercharging the small Offy—can, if successful, change the future trend of racing-



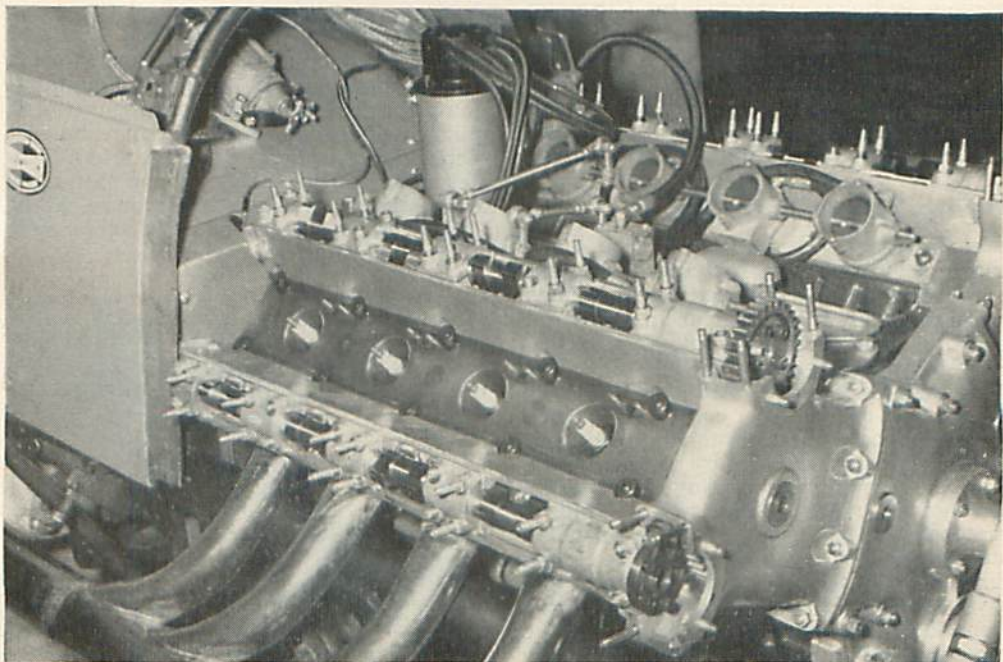
The 1955 tires have only two tread ribs and a much narrower width than in 1954. Here's how one looks prior to the race

car design. But the veteran machines are not likely to give up without a fight.

Not new, but still exciting, is the formidable Novi. Since their first appearance at Indianapolis in 1941, the Novis have been

(Continued to page 272)

Full-race Studebaker V8 has dual-camshaft racing heads, four valves per cylinder, fuel injection and 400 hp.





Batteries Replace Gasoline In Electric Motor Scooter

Powered by a $\frac{3}{4}$ -horsepower traction-type electric motor drawing current from four automotive batteries, a new electric tricycle is being marketed by Cushman Motor Works, Inc. The new machine is called the 730 Electric and will travel up to 40 miles without recharging. It has an all-steel body, and the rear wheels are driven by a heavy-duty wedge belt. There are two speeds forward and one in reverse.

Mexico Puts Atom to Work

In keeping with its government's announced purpose of employing atomic energy only for peaceful purposes, Mexico has put the atom to work in an industrial plant. A radioisotope thickness gauge, activated by strontium 90, has been installed in a Mexican tire plant to control the weight and thickness of continuously produced tire cord. Radioisotope gauges control production machines by measuring the number of beta rays passing through the product as it moves past a small pill of radioactive strontium 90. The machine automatically adjusts to correct thickness through the strength or weakness of the rays. Mexico also is working toward construction of a number of reactors to be used for research and possibly for power production.

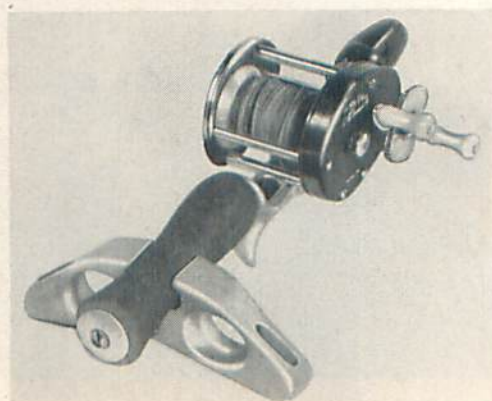


Nine-Pound Cable Hoist Pulls Stump Out of Ground

Weighing less than nine pounds, a midget cable hoist is strong enough to pull stumps out of the ground. It is ideal, too, for loading a boat on a trailer or hauling a car out of a ditch or snowbank. You simply fasten one end of the cable to something solid, like a tree or telephone pole, and pump the handle back and forth to exert a pull of 1500 pounds or, with the double-strand hoist, a pull of 3000 pounds.

Clamp Holds Fishing Pole

You can handle two fishing poles at a time if you place one in a cast-aluminum clamp that holds the rod in a firm grip. A spike or stick can be placed in a hole at each end of the clamp to secure it to a boat, pier or the ground. The clamp is hinged so its jaws grip the rod firmly or release it easily when it is removed. The lightweight holder fits in tackle box or pocket.



Jet Powers Boat

Powered by a jet-aircraft engine, a new hydroplane has been built in England for an assault on the U.S.-held water speed record of 178.497 miles per hour. Pilot of the hydroplane is Donald Campbell, son of the late Sir Malcolm Campbell, whose *Bluebird* held the speed record in the late 1930s. The new craft, also called *Bluebird*, is driven by the jet discharge into the air, as in an airplane. Steering is achieved with a marine-type rudder. The



new *Bluebird* reportedly has excited the interest of both American and British Naval officials.



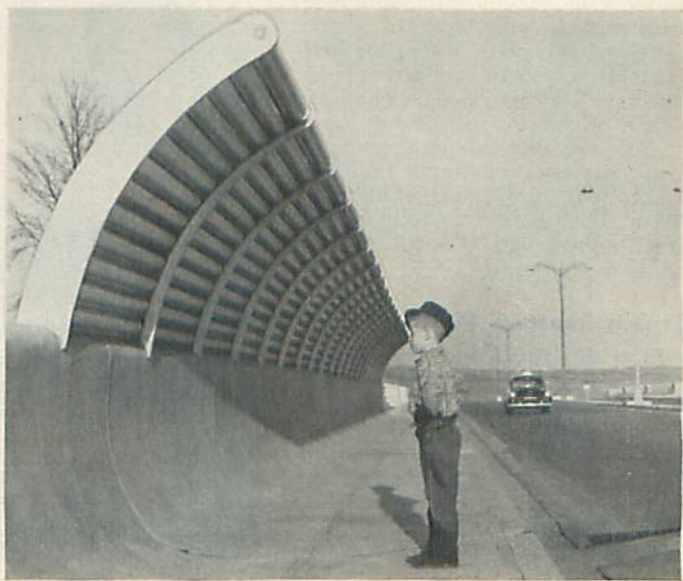
Brainy Computer

Billed by its makers as the smartest electronic brain ever built is a giant computer called the NORC, for Naval Ordnance Research Calculator. The NORC was designed for high-speed calculation heretofore impossible because of the time involved. For instance, it can perform 15,000 arithmetical operations a second, or a billion in less than 24 hours. This is the equivalent of a thousand persons calculating on paper for a lifetime.

Arching Barriers Protect Railroad

Overhanging railings which arch back eight feet over the sidewalk have made a highway bridge over the Pennsylvania railroad near Washington, D. C., extremely frustrating to small fry. The steel and concrete railings were designed to keep small boys from tossing miscellaneous junk on the rails below. Boys cannot even see the tracks, to say nothing of throwing things on them.

Early this year, the first farm tractor produced in Turkey rolled off an assembly line at Ankara.





An Andrews Air Force Base airman displays the projector unit of a transmissometer, or visibility meter, which records fog or dust in the air from interference on a photoelectric cell

USAF Increases Safety With Visibility Meter

Visibility estimates of the weatherman at Andrews Air Force Base, Md., are now supplemented and checked electronically by a transmissometer, an ingenious visibility meter. The transmissometer consists primarily of an intense light and a photoelectric detector, or electric eye. Light is projected through the atmosphere toward the detector, and its intensity recorded. Dust, fog or smoke reduces the amount of light received and the decrease in visibility shows up on the transmissometer as information that can be transmitted from the weatherman to pilots flying in and out of the field. Andrews is the first USAF installation of the instrument, although it has been tested at other military and civilian fields. The Air Force plans to install transmissometers at approximately 20 more bases at present. The instrument is regarded as particularly valuable because it can be operated by remote control at fields where the weather station may be located some distance away.

California Welder Makes Furniture From Chains and Reinforcing Rods

Metal chain welded together so that it is rigid forms a floor lamp made by Arthur Gurley, a welder and real-estate salesman of Long Beach, Calif. A telephone table he built was made with concrete-reinforcing rods bent to shape. Gurley, who plans to fill his bedroom, living room and dining room with similar furniture, has already made a coffee table, floor lamp, two flower stands, smoking stand, bookcase and telephone table for a total cost of \$12 and 32 hours of labor. The furniture, though heavier than average, is not too heavy to be moved easily.

Finish Protects Pins

Bowling pins coated with a new plastic don't become battered from hard usage, last longer and are easier to clean and maintain, according to the American Bowling Congress. The organization recently put its stamp of approval on the plastic finish after exhaustive tests had been made.



THE INDEPENDENTS may not be winning the sales derby, but they certainly showed their tail pipes to the Big Three in the Mobilgas Economy Run.

In actual miles per gallon (the only figure that means much to a car owner), the top four cars were all independents:

Rambler 6—27.5 m.p.g.

Studebaker Commander V8—27.4 m.p.g.

Studebaker President V8—25.3 m.p.g.

Nash Ambassador 6—25.2 m.p.g.

In fifth place was the first of the Big Three entries—the Ford 6 with 22.8 m.p.g., considerably less than fourth-place Nash.

Here is the way the other entries finished in order: Oldsmobile 88 (22.6 m.p.g.); Dodge Custom Royal V8 (22.3 m.p.g.); Hudson Wasp 6 (22.1 m.p.g.); Pontiac V8 (21.6 m.p.g.); Mercury V8 (21.6 m.p.g.); Chevrolet 6 (21.6 m.p.g.); Hudson Hornet 6 (20.7 m.p.g.); Ford V8 (20.6 m.p.g.); Buick Roadmaster (19.8 m.p.g.); Chevrolet V8 (19.6 m.p.g.); Plymouth V8 (19.4 m.p.g.); Chrysler New Yorker (19 m.p.g.); Lincoln (18.9 m.p.g.); Packard Patrician (18.8 m.p.g.); Chrysler Windsor (18.2 m.p.g.); DeSoto (17.9 m.p.g.).

One Cup of Gas Needed

Everything is cut so fine in the Economy Run that you, the average driver, will do well to come within six miles per gallon of the above figures in your personal driving. Cutting things too close brought grief to the Dodge Coronet V8 entry. On the first day, the driver took on only eight gallons of gasoline (the less fuel, the less weight and therefore the better mileage). He should have taken on the eight gallons plus an extra cupful! He ran out of gasoline about three miles from the impound area. That was the end for him.

In ton miles per gallon (a computation that tends to give big cars an equal chance with the small ones), there was virtually no difference between the first two cars. The Studebaker V8 had 58.6320 ton miles per gallon and the Nash Ambassador 6 had 58.5560. Studebaker admitted that this tiny margin could have been achieved simply by hitting a couple of stoplights on the green—a slender cord to hang on!

Incidentally, the Rambler driver, Les Viland, who won top honors in miles per gallon, is the same guy who won for Ford and Lincoln in previous years. If that keeps up, folks will soon think the driver is more important than the car—and he often is!

What does all this prove? Not much except that the guy who tells you he is averaging 20 miles per gallon in his big, powerful Putter V8 is probably cheating a little. If he isn't, he should enter the Economy Run.

Anyway if you drive 10,000 miles a year, the difference between 22 and 18 miles per

Detroit Listening Post



By Leo Donovan

gallon is about \$30 a year or about 50 cents a week. When you're spending \$3000 for a new car, what's 50 cents a week?

Notes From Here and There

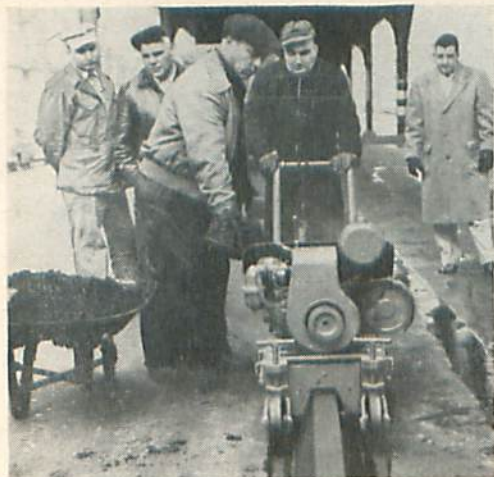
Don't complain about your car by moaning that "It rides like a truck." Phil Monaghan, general manager of GMC Truck & Coach, is waging a campaign to end such slander. Today's trucks drive and ride like passenger cars, he says . . . Do you know that GMC makes 128 different truck models? They could build 1,250,000 trucks without duplication if they had to!

As predicted here months ago, colored tires are now available . . . Industry stories promise a 100,000-mile tire that stands up under continuous high speed. Produced by the cold-rubber process (see PM, Sept. 1948), the tire may eliminate the spare, giving more freedom in rear-deck styling.

Rubber fenders, once a cartoonist's gag, are practical, says the Natural Rubber Bureau. They can be made lighter and cheaper than steel . . . a flexible paint makes them shine . . . and it's impossible to dent them.

Dodge is mass-producing La Femme, the car designed for the ladies . . . introduced as a show-car gimmick with matching rain-gear and cosmetic case, it is now ready for the Missus . . . Dodge's answer to the GM four-door hardtop is a four-door Lancer . . . Not really a hardtop, it has Lancer three-tone paint styling to make it look like a hardtop despite the very real center post . . . By the way, if you want a Dodge 6, you'd better buy one now . . . This might be the last year that the engine is available for passenger cars.

The 1956 cars are finalized, but secret of course. Horsepower will be up with 200 horsepower being common . . . 1500 orders for the Chrysler 300 came in before anybody even drove a production model. Carburetor trouble delayed production late in March. The 300s you read about were merely handmade prototypes . . . What did these 1500 customers order? Horsepower, obviously . . . and Detroit can take a hint.

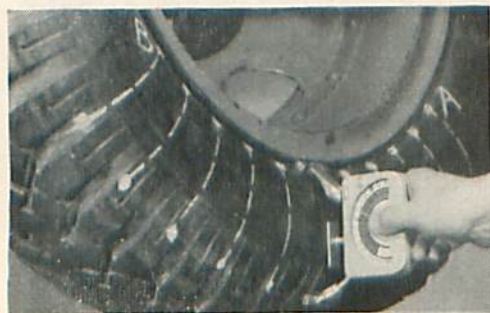


Machine Makes Curbing Faster and at Lower Cost

Traffic-safety islands are constructed quickly and cheaply with a mechanical curb-maker. The machine places and compacts bituminous concrete on top of the old pavement for the curbing. Bituminous concrete is a mixture of sand, gravel and a bituminous binder commonly called black-top. Earth or blacktop is then used to fill in the area between the curbs. Curbs made with the machine cost 50 cents per foot instead of five dollars per foot.

Gauge "Weighs" Truck By Measuring Tires

By measuring the deflection of the sidewall of each tire, a German device "weighs" the truck's load. A flexible steel strap stretched between two short arms follows the shape of the tire's sidewall and from this shape it determines the weight the tire is supporting. It is said to be accurate within 25 pounds once the gauge has been set for the type of tire being checked. The device eliminates the need for driving trucks up on scales to find out if they are overloaded. ★ ★ ★



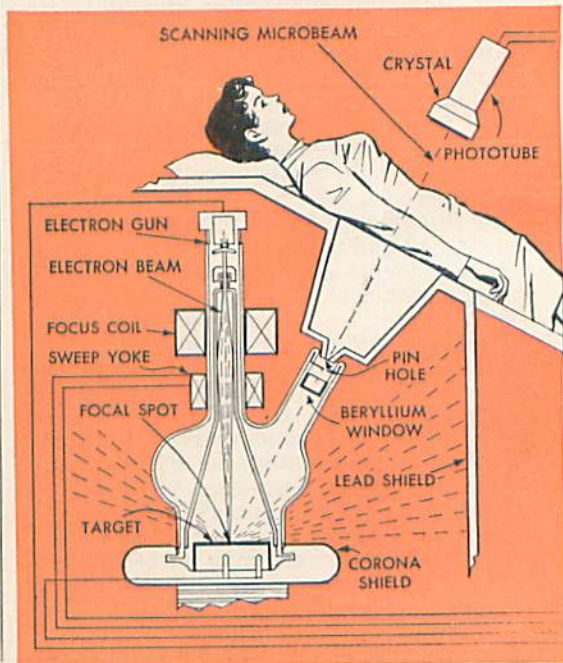
X Ray Shows Cancer on TV Million Times Brighter

CANCERS DEEP within the body can be detected in their infancy with an X-ray system that registers a moving picture on a television screen. The system, now nearing perfection at the University of Chicago, may also be used in setting bones.

Most important, the TV X ray produces an image 1,000,000 times brighter than that of the standard fluoroscope, yet exposes the patient to only $\frac{1}{100}$ the dosage. Current methods of X-raying such areas as the stomach result in heavy exposures to radiation, sometimes near the danger level.

The TV X-ray system, developed by Dr. Robert J. Moon, uses a thin X-ray beam that sweeps across an area like the scanning ray of a TV camera. The information contained in the X-ray beam is then extracted by means of a thick detector system. It is this feature that cuts down the X-ray dosage to the patient.

A TV-type scanning X-ray tube in the machine directs a sweeping beam of electrons upon a tungsten target. The tungsten transforms the energy of the electrons into X rays. A pinhole in the lead housing of the X-ray tube together with the fine focal spot on the target produces a thin X-ray beam. This beam duplicates the sweeping motion of a scanning system and is directed through the patient and against



a calcium-fluoride crystal more than three inches thick.

The crystal transforms the X-ray pattern into a pattern of bursts of ultraviolet rays. These bursts are picked up by a photomultiplier tube which converts them into electric impulses and amplifies them millions of times. The amplified impulses are passed to a conventional television picture tube on which the image can be enlarged or diminished.

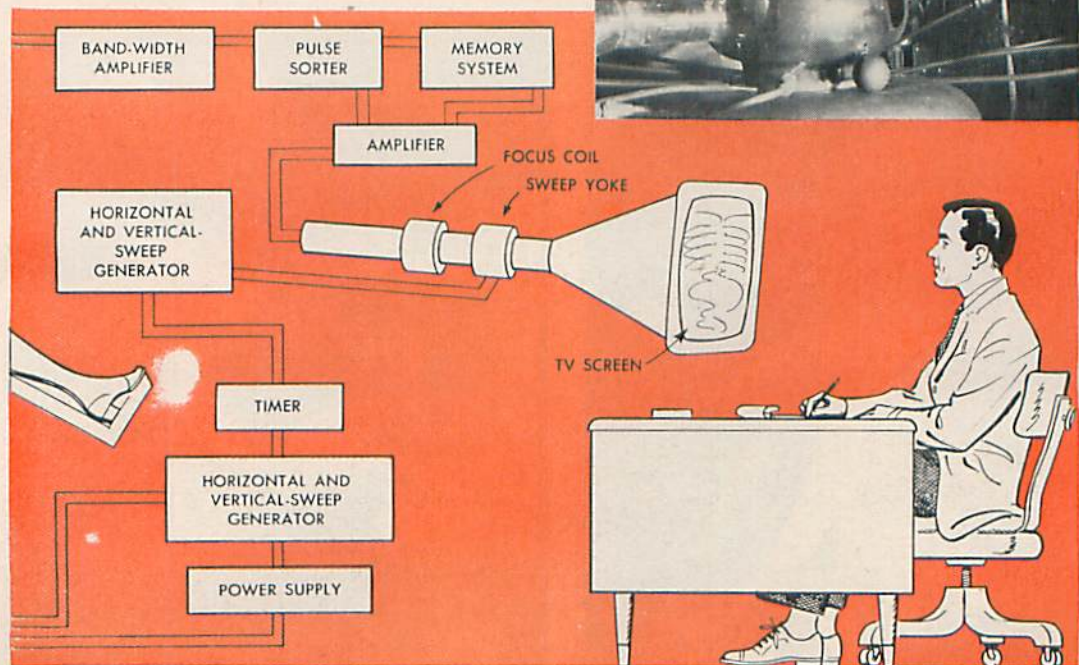
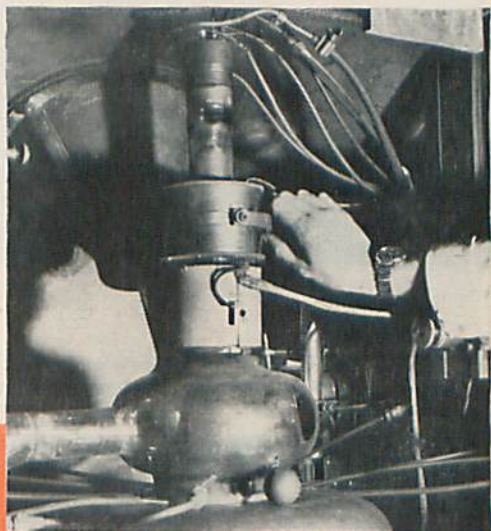
By flicking another dial, the operator can stop the picture and hold the image on the screen for an indefinite period. This is done with a commercial "memory tube." By this method an area can be given thorough study long after it has been removed from the X ray.

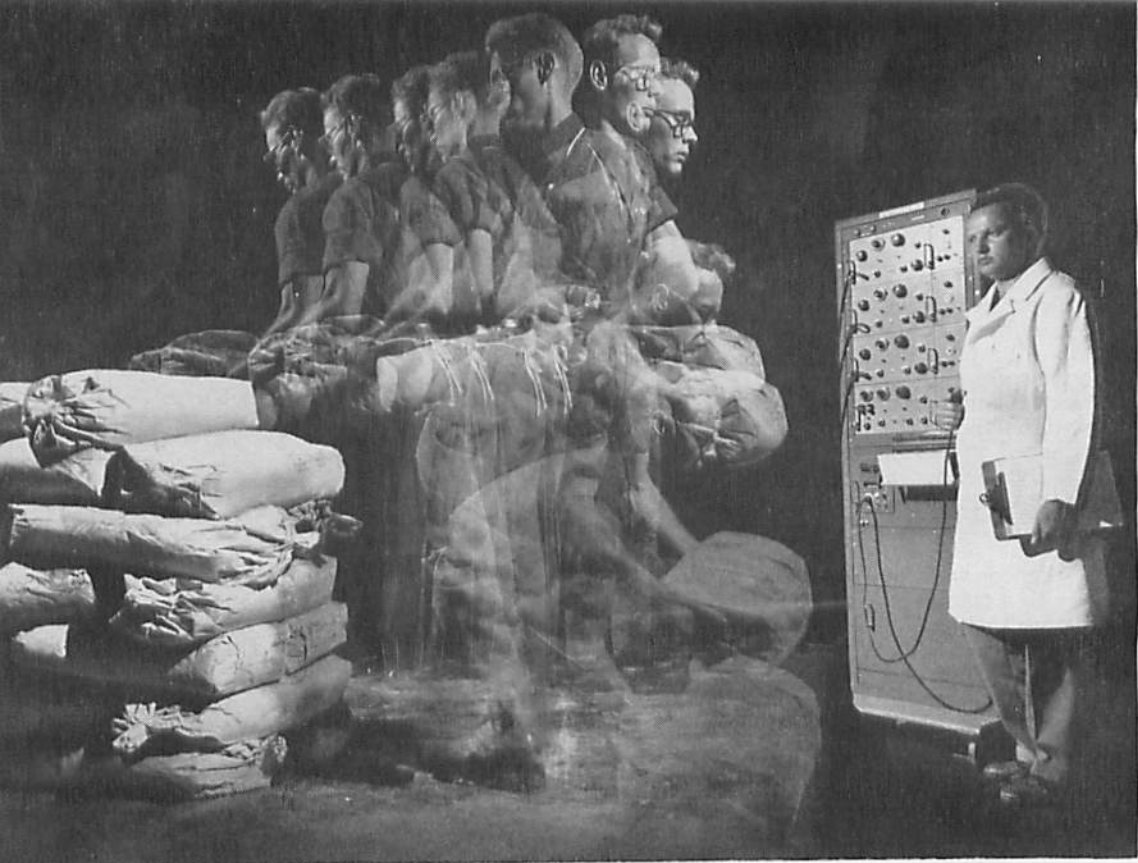
With simple adjustments, the machine can serve as an X-ray microscope. It will magnify up to 500 times.

The only model of the new investigatory tool is set up solely for experimental purposes and is not designed for hospital use. However, a hospital model based on the same principles could spot a stomach cancer only $\frac{1}{16}$ inch in size. Under the conventional X ray, a stomach cancer must be at least $\frac{1}{2}$ inch in size to be seen. Medical scientists say that by then it is often too late for a successful operation. ★ ★ ★



Dr. Robert J. Moon tunes in the X-ray motion picture on the television screen. His right hand is near the housing of the calcium-fluoride crystal and phototube (see diagram at bottom of page). Below, it is this tube that sends a stream of electrons through area under study



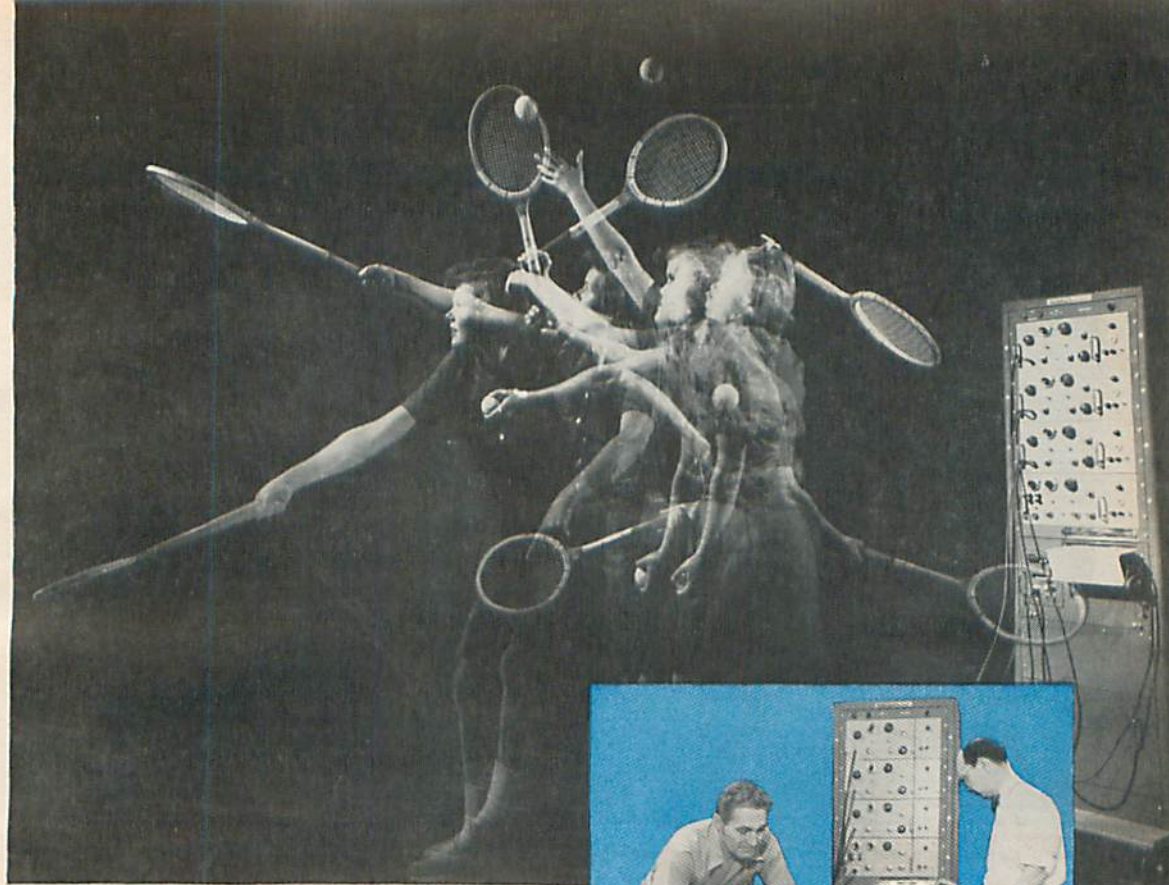


Camera traces movements of worker as he shifts 50-pound bags. Instrument in background records work output

Man mounts stepladder on the Lauru platform and proceeds to paint ceiling. Recorder shows that his peak energy is one sixth that of man lifting bags

Stenographer performs a curtsy in energy tests as she places papers in a filing cabinet. She uses twice the energy of a housewife ironing a shirt





Serving a tennis ball takes about the same energy as lifting 50-pound bag. Who says play isn't work?

Why Do You Get Tired?

By Clifford B. Hicks

WHO WORKS HARDER, the husband or the wife? At the end of the day, with the dinner dishes still to be washed and the kids wrangled into bed, has Pop—or Mom—earned squatter's rights on the easy chair? Who puts forth the most energy, the housewife or the career woman? And how about that rumored speed-up at the plant: Will it really tire you more?

These are just a few of the countless questions that soon may be tagged with scientific answers. The facts will wiggle out of a remarkable new instrument in the form of ink lines on a sheet of graph paper.

The instrument, recently installed in a research laboratory 18 miles southwest of



Platform measures the energy output of a movement in any direction. Results are shown on graph paper. Below, housewife ironing a shirt uses twice the energy of her husband as he paints the ceiling





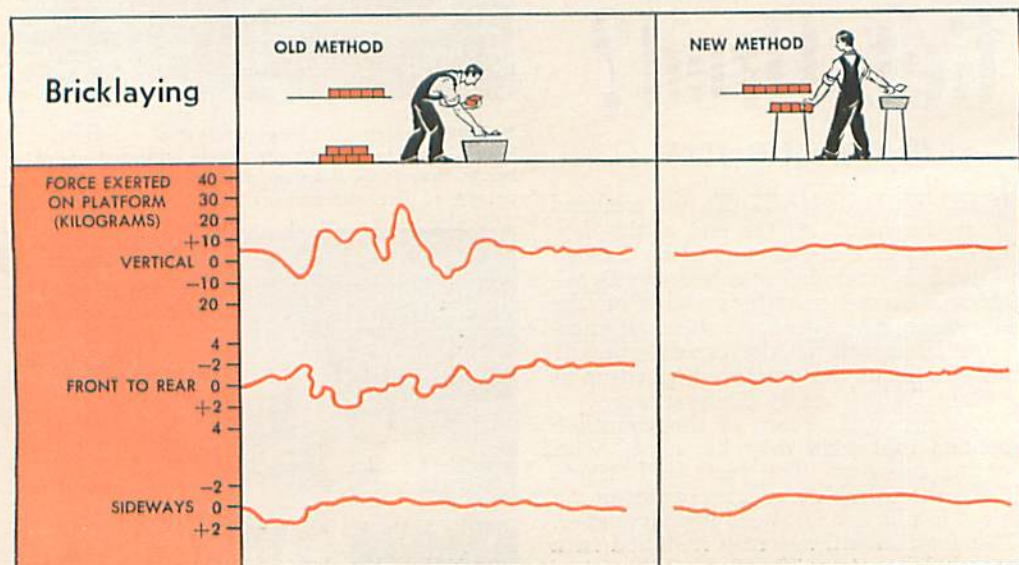
Wrong clothing can quickly produce fatigue. Arctic suit is tested in zero temperature in all-weather room

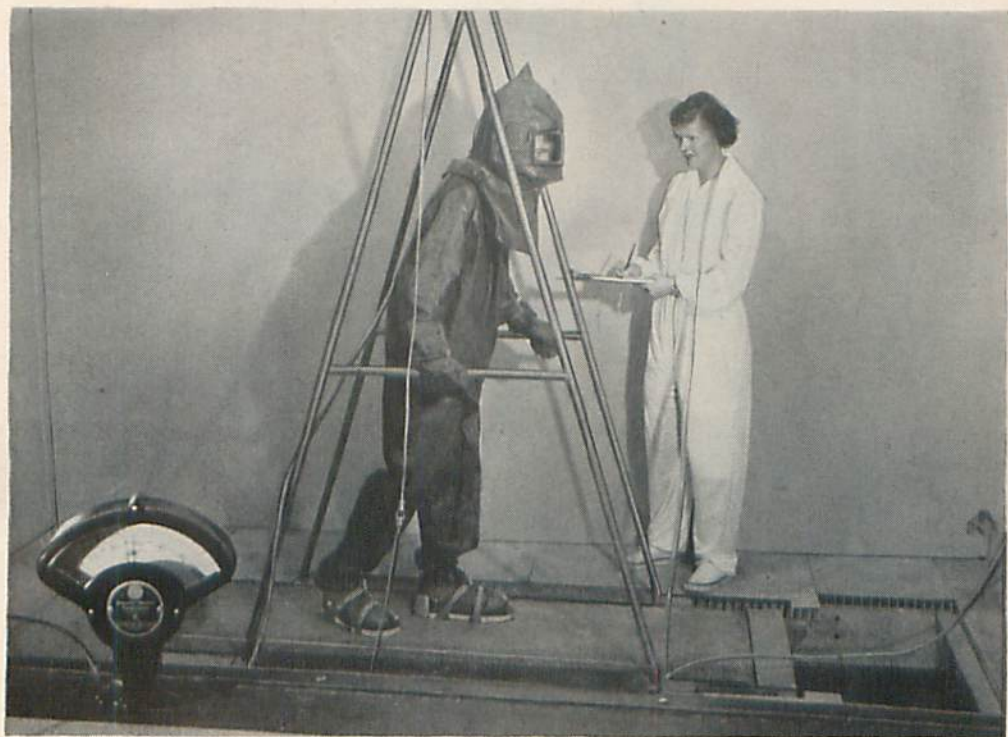
Wilmington, Del., is playing its part in a broad program designed to answer one question: What makes people tired?

The answer, when it's found, may bring startling changes in working habits, working conditions and the design of tools and clothing.

Surprisingly little research has ever been done to find out why you get tired. The obvious answer, of course, is that working makes you tired, but what actually takes place inside your body when you become plumb tuckered out? Is there a change in your breathing, your pulse rate,

Lines trace work output of bricklayer. Note how they smooth out when bricks and mortar are at waist level





Subject tests the value of an air-cooled suit as he walks steadily on treadmill in a hot and humid room

the chemicals in your blood stream, the amount of oxygen you extract from the air you breathe? Can you become so utterly "beat" that you will never fully recover your energy?

Such questions have a direct bearing on the health and output of every worker. The DuPont Company has decided to find out the answers, and a research program in fatigue is now underway at DuPont's Haskell Laboratory for Toxicology and Industrial Medicine.

To take charge of the research, DuPont selected Dr. Lucien Brouha, a 50-year-old physiologist who belies his own work, for he has a tremendous and apparently inexhaustible storehouse of energy. At the end of a day with Doctor Brouha an observer is a top-notch subject for a study in fatigue, but the scientist still erupts with the same energy he displayed when he burst into the laboratory that morning.

"Even we physicians can't agree on a definition of fatigue," says Doctor Brouha. "Basically it's a tendency toward inactivity. Most of us suffer from one of three types of fatigue—physical, mental or nervous. Unfortunately we can't yet measure the effects of mental and nervous fatigue. But with some precision we can measure physical fatigue and its effects. With these measurements we hope to track down some of

the causes and perhaps eliminate them.

"A surprising amount of exhaustion in the world is caused solely by physical activity. It's obvious that the man who wrestles big castings is spending a lot of energy. It's not so obvious but equally true that the filing clerk, the bank teller and the housewife also spend a vast amount of energy in one day's work. Some day we may be able to measure accurately the effects of nervous and mental fatigue, but meanwhile we are trying to find out what makes people dog-tired and what we can do about it."

Doctor Brouha likes to use a figure of speech in discussing fatigue. "You have a 'bank account' of energy which you build up by deposits to your credit whenever you rest. As you work, you make withdrawals from your account. If you withdraw more than you put in, you eventually overdraw your account. At that precise point, exhaustion sets in and you may never be able to build up your account again."

To determine where this point occurs, Doctor Brouha is running some unique experiments with strange equipment. The instrument which may settle the husband-wife controversy is a small platform invented by Lucien Lauru, a French engineer. Only two such platforms exist, one at the Haskell Laboratory and the other in



Volunteer rides a bike in fatigue test. Instruments measure her oxygen extraction and carbon-dioxide output

France. The platform does a job that has never been done before—it measures the energy expended by anyone who performs work while standing or sitting on it.

For decades time-and-motion engineers have measured the *useful* work a man performs. A man who raises a 100-pound bag two feet does 200 foot-pounds of useful

work. But to Brouha this figure is misleading, for it doesn't include the work the man does in lifting the upper half of his body the same distance, the work expended in stopping the movement of the bag or the effort required to move it sideways.

Thus, using the same example, engineers

(Continued to page 246)

Instruments in observation room record subject's temperature, pulse rate, blood pressure and other reactions





Underwater Tree Cutter Grasps Trunk as It Saws

Trees carried by dirt slides into rivers could be cut at the base by a machine that works underwater. A small working model, developed by the Army Corps of Engineers at Louisville, Ky., has a frame on which runs a shaft. One end of the machine connects to an electric motor. The other end has pneumatically operated claws designed to grasp the tree firmly while a rotary cutter slices through the trunk.



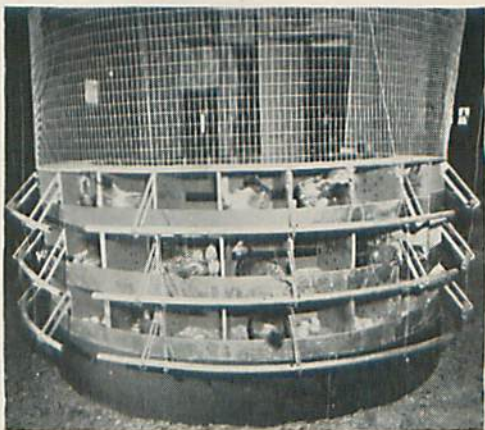
Angler Turns Dial on Case To Find Desired Lure

By turning the dial of a new plastic container, the fisherman can select and remove any desired artificial fly. The container can be attached to a belt, creel strap or waders. Inside is a continuous belt made of lamb's wool which holds the flies. The fisherman turns a dial knob on the outside of the case to rotate the belt and bring any fly he desires to the top of the case for removal. The unit is moistureproof and ventilated.

Circular Tier of Nests Makes Egg Gathering a Speedy Chore

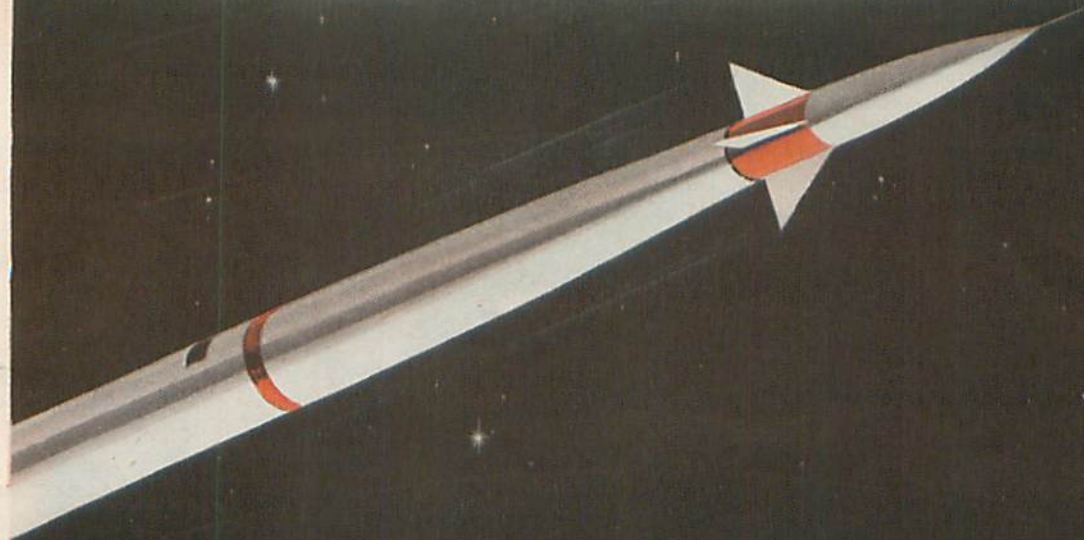
Poultrymen can gather eggs in a hurry with a circular nest arrangement that saves steps. Inside the six-foot-diameter circle he can collect eggs from 72 to 96 nests, at the same time sorting dirty or small eggs into separate baskets. A box of clean litter for

replenishing the nests can be kept within the circle, which is reached through a door in the side. Hens are prevented from getting inside by flaps on the rear of the nests, which swing inward to allow nest cleaning or egg gathering.



Drawing shows a multiple-stage rocket with first stage falling away as it zooms toward outer space. It may be that a rocket of this type has "escaped" to circle the earth





Have We Sent a Rocket Into Space?

HAS THE UNITED STATES launched the earth's first artificial satellite?

Persistently, that report has reached *Popular Mechanics* from various independent sources. As yet it lacks any official confirmation, but the recurrence of the report is significant.

The story goes that the event took place months ago, possibly at the Banana River rocket range in Florida. The manmade object is said to be some 800 miles out in space (unless it has spiraled back into the atmosphere in the last few weeks.) Its fuel long since expended in reaching this altitude, it would be traveling at the incredible rate of 16,000 miles per hour on its own momentum. At that speed it would be whirling around the earth 13 times a day, once every hour and 51 minutes.

If this rumor cannot be vouched for as true, neither can it be rejected as preposterous. The time is ripe for such an event to happen. If it has already happened, it is a tremendous milestone in scientific achievement—a first stupendous step toward that ultimate aspiration of man, to travel in interstellar space. True or premature, it is worthwhile now to review what has been done and to speculate on the steps yet to be taken.

That the United States was making studies looking toward the creation of a satellite rocket was first announced seven years ago by the late James Forrestal, then

Secretary of Defense. There have been denials recently that the work was continuing, but the obvious fact is that research never has ceased: The big rocket motors and violent fuels needed for launching a satellite are under constant study.

The experts say that a manned satellite could be launched into space within 10 years, a rocket to the moon in a not much longer time. So any rocket "on the loose" today is likely to be no crew-carrying space platform. It would be the final stage of a multiple-step rocket fired experimentally. The implication is that this was an experiment that worked too well. A rocket that was expected to return to the earth inside a certain impact area kept on going until it disappeared beyond the horizon. By accident, the last step had been launched at an angle and speed that put it on an orbit around the earth.

Designers of rocket motors that have an enormous thrust have been faced for years with the problem of how to prevent their conceptions from flying off into space, never to return. This may be one of the reasons why most intercontinental rockets designed to date are intended to fly relatively low and slowly through the atmosphere. An intercontinental missile that would be boosted by huge rocket motors up through the outer edge of the atmosphere might attain the velocity of escape and get away entirely.

MILES

900

800

700

600

500

400

300

200

100

50

25

18

ORBIT OF RUMORED U.S. SATELLITE

SMALL NATURAL SATELLITES
MAY EXIST HERE OR AT
GREATER ALTITUDES

AURORA
POLARIS
40 TO 600
MILES UP

MOST CONDITIONS
OF OUTER SPACE
EXIST HERE

WAC CORPORAL

"BUMPER"
TWO-STAGE
ROCKET

VIKING
ROCKET

V-2

VIRTUALLY A COMPLETE
VACUUM FROM HERE UP

HIGHEST FLIGHT
BY MAN
(18 MILES)

MOUNT EVEREST
(5.8 MILES)

METEORS FLAME
150 TO 50 MILES
ALTITUDE

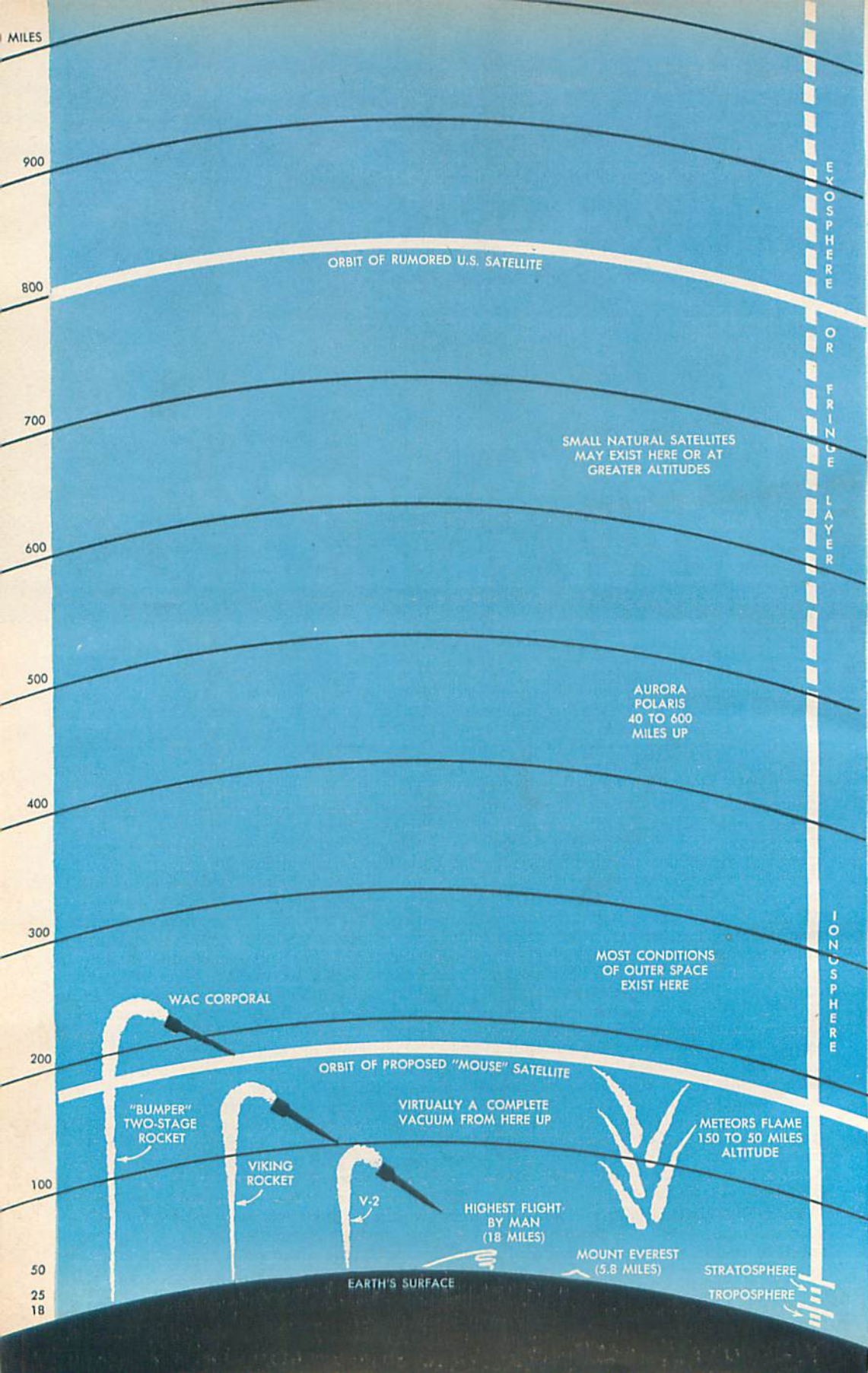
EARTH'S SURFACE

STRATOSPHERE
TROPOSPHERE

EXOSPHERE

OR
FRINGE
LAYER

IONOSPHERE





Operator "rides along" on antenna of radar apparatus used for tracking rockets. Right, two-stage Bumper rocket combines the small WAC Corporal with a giant V-2

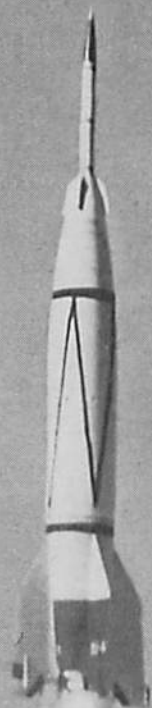
But, what if a missile like that is deliberately put on an orbit around the earth? Suppose that it carries an atomic warhead and holds enough unexpended rocket fuel in reserve to be fired back down through the atmosphere to pinpoint a particular target in response to a coded radio signal? The nation that has atomic bombs "on ice" in the sky, under control, will have a fantastic military advantage over any possible enemy on our planet.

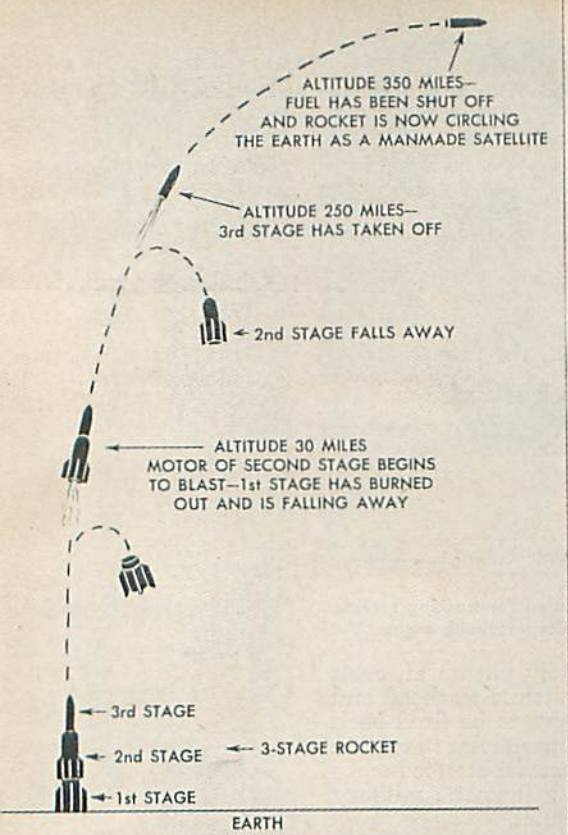
Already we have a number of short and medium-range guided missiles working for our armed forces. Ground-to-air NIKE missile emplacements guard key American cities against air attack. The latest announcement in this field told of an air-to-air missile which an interceptor plane could fire and steer against an enemy bomber. Still supersecret is Convair's Atlas project, which has been reported in the newspapers as a rocket-powered projectile that would roar far out into space.

While we are experimenting toward satellites, we are watching the skies for natural satellites—and, no doubt, for evidence that scientists of other countries are experimenting in space. A year ago, astronomer Clyde W. Tombaugh was commissioned by the Army's Office of Ordnance Research to hunt for any natural satellites that may be orbiting around the earth. He devised a special technique for seeking them. One reason for the search is that a study of their tracks would tell a great deal about how artificial satellites would behave. Another is that such an object might, in the indefinite future, be put to use as a space platform for scientific studies. Further, if all natural satellites could be mapped, any new object that suddenly appeared in the sky might be suspected as manmade. Naturally, this poses the problem of defense. Any threatening satellite sent aloft by an enemy would have to be sought out and destroyed by a guided missile.

What prevents a satellite from plunging back into our atmosphere or from whirling indefinitely out into space? Prof. Samuel Herrick of the University of California at Los Angeles explains that a close-in satellite would be governed by the same principles of celestial mechanics that control our huge natural satellite, the moon. In each case the gravitational pull of the earth is balanced by the centrifugal force of the speeding object. And because there is nothing to slow it, the satellite maintains a perpetual orbit.

The closer a satellite is to the earth, the faster it must travel to maintain an orbit. Thus the moon, 238,000 miles away, has an orbital speed of 2700 miles an hour. A satellite only 1000 miles distant





ROCKET VELOCITY VS. HEIGHT

VELOCITY (miles per second)	HEIGHT ATTAINED (in miles)
1	82
1.39 ("Bumper" rocket)	250
2.5	500
5	4,000
6.89	238,000 (distance to moon)
6.95 (velocity of escape)	Infinity

TABLE OF SATELLITE PERIODS

ALTITUDE (in miles)	VELOCITY (in miles per second)	PERIOD (minutes to complete orbit around the earth)
400	4.68	97
600	4.57	104
800	4.48	111
1000	4.38	118
1200	4.30	125

would have to move at 15,700 miles an hour to keep on a steady orbit. The moon takes 27 days to travel once around the earth; in a little less than two hours a satellite 1000 miles away could complete its orbit.

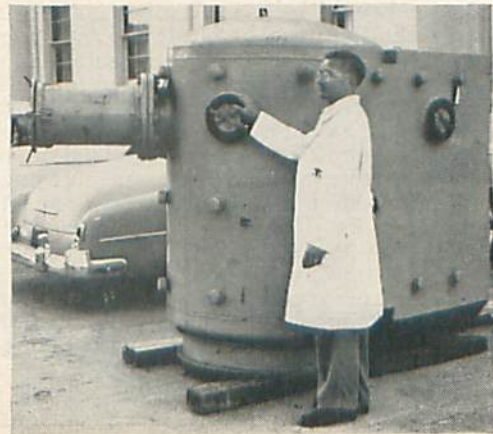
Space-travel enthusiasts have estimated that it would be relatively easy and cheap to put an unmanned rocket on an earth-girdling orbit. Already two-step rockets have been launched. The scientists estimate that a three-step rocket might do the trick. The Bumper rockets that have been fired

at White Sands Proving Ground and elsewhere consist of a 16-foot WAC Corporal fitted into the nose of a 47-foot V-2 rocket. The WAC Corporal alone can reach an altitude of 43 miles. A V-2 averages around 100 miles' altitude. But when the WAC Corporal is fired as a second-stage rocket from the nose of a V-2 during ascent, it attains an altitude of 250 miles.

Prof. Fred S. Singer of the University of Maryland has estimated that several small

(Continued to page 268)

Left, test stand for big rocket motors; right, sealed chamber represents cabin of spaceship at school





Curling Stone Equipped With Rollers Takes Game off the Ice

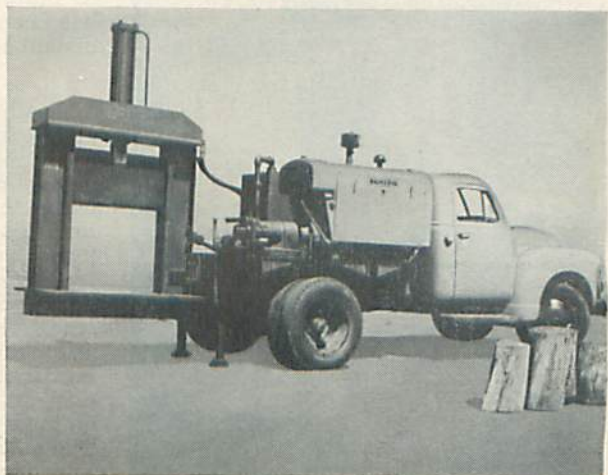
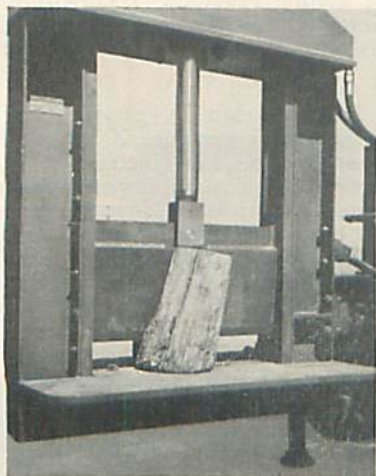
Curling without ice is the latest sport at Garmisch-Partenkirchen, Bavarian Alps winter-resort center. The game of curling has always before been played with heavy stones, equipped with handles, which are

hurled along the ice so that they come to rest near a goal line. The curling stones designed for the iceless method are fitted with rollers so that the game can be played on a bowling alley.

Hydraulic "Guillotine" Mounted on Rear of Truck Splits Firewood

Logs up to 30 inches high and 36 inches in diameter are split by a custom-built "guillotine" mounted on the rear of a truck. A hydraulic pump forces the blade down

in $4\frac{1}{2}$ seconds and retracts it in $2\frac{1}{2}$ seconds. The pump is driven by a 60-horsepower gasoline engine mounted on the bed of the $1\frac{1}{2}$ -ton truck.





KEEPING UP WITH THE ATOM



NOT YET TRIED on human patients, a method of treating cancer of the brain, lung and pancreas with radioactive isotopes of cesium is under study at Argonne Cancer Research Hospital, Chicago. The experiment would involve implanting in the chest or brain plastic envelopes containing cesium.

☆☆☆

Dentists have put radioactive energy to work as a research tool. At the University of Michigan's school of dentistry, scientists are trying to determine how calcium hydroxide—used by dentists to seal the pulp of diseased teeth—is absorbed. To study the process they are “tagging” the sealing compound with radioactive isotopes.

☆☆☆

To detect sources of weak radioactive leaks in “hot” zones of the atomic plant at Hanford, Wash., General Electric has developed a “bazooka” radiation detector (below). The 30-inch instrument contains a 12-pound lead sphere pierced to admit a thin stream of rays. When these rays strike a sensitive sodium-iodide crystal at the center of the sphere the crystal emits light in proportion to the radiation bombarding it. A photoelectric tube converts this light into measured electric current.



Britain has laid plans for construction of 12 nuclear-power stations which by 1965 will have a capacity between 1,500,000 and 2,000,000 kilowatts—electric power that would require the burning of 5,000,000 to 6,000,000 tons of coal in a conventional power plant. The engineers expect to develop as much heat from one ton of uranium as from 10,000 tons of coal. A valuable by-product will be plutonium. First of the power plants will be started in 1957 and in operation by 1960-61. An experimental prototype station is nearing completion in the northern part of England.

☆☆☆

Cleveland, Ohio, will be the site of a Nuclear Congress and Atomic Exposition next December 12-17 under the auspices of a dozen organizations of scientists and industrialists headed by the Engineers Joint Council.

☆☆☆

America's first atomic power plant capable of delivering a sizable volume of electricity is expected to be completed in 1956 at Argonne National Laboratory near Chicago. It is scheduled to produce a total of 5000 kilowatts.

☆☆☆

Technetium is an element discovered in fairly large quantities as a by-product of atomic fission in nuclear reactors, but not found in appreciable amounts elsewhere on earth. Now scientists have learned it has the capacity of absorbing harmlessly slow neutrons, much as graphite, boron, cadmium and zirconium do. Zirconium is used in building atomic reactors. Technetium has been detected recently in some of the distant stars.

☆☆☆

Another humanitarian by-product of atomic research is a portable X-ray machine that requires neither electricity nor water—not even a darkroom. It uses radioactive thulium and prints an X-ray picture immediately on radiosensitive paper which needs no development. The Armed Services Medical Research Laboratory at Ft. Knox, Ky., developed the unit. With its lead-lined protective case it weighs only 48 pounds, and so could be carried on a battlefield, or in an ambulance or physician's car. Injured persons could be examined for fractures before being moved. The machine is expected to cost \$200 when in production.

Plastic Body On Small Auto

Plastic is used in the body of the new Brutsch sports car, shown at European auto shows this year. The tiny two-seater has a two-cylinder engine of 200-cubic-centimeter displacement. It develops only 11 horsepower and has a top speed of 66 miles per hour. The body has no bulges, even the headlights and wrap-around bumper being flush.



Tot Bends Rail

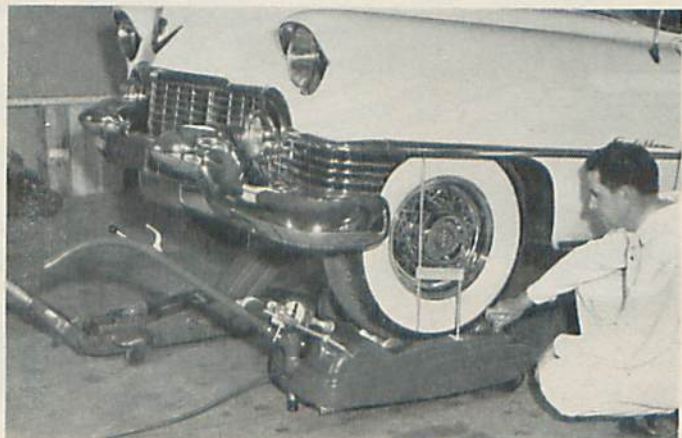
Six-year-old Cynthia Allen found, at Boston's Museum of Science, that even she could bend a section of railroad track with the force of her weight. An instrument dial in the exhibit registers the slightest pressure exerted against the heavy steel rail in terms of millionths of an inch. The sensitive device, designed by General Electric, is a permanent addition to the museum.

Extra Push for Sabres

Improvement in the already sensational performance of the Air Force's North American F-86D Sabrejet has been achieved with an advanced model of the General Electric turbojet engine. Identified as the J47-GE-33, the modified power plant produces 10 percent more thrust than the J47-GE-17, with which it is interchangeable.

Tires Made Round Right on the Car

Without removing the wheel from the car, mechanics can take the "thump" out of tires with a portable tire-rounding machine. Powered by an electric motor, the device has an endless abrasive belt that removes rubber from the high spots in small dry particles that are not gummy. The machine works automatically and will not remove an excess of rubber.





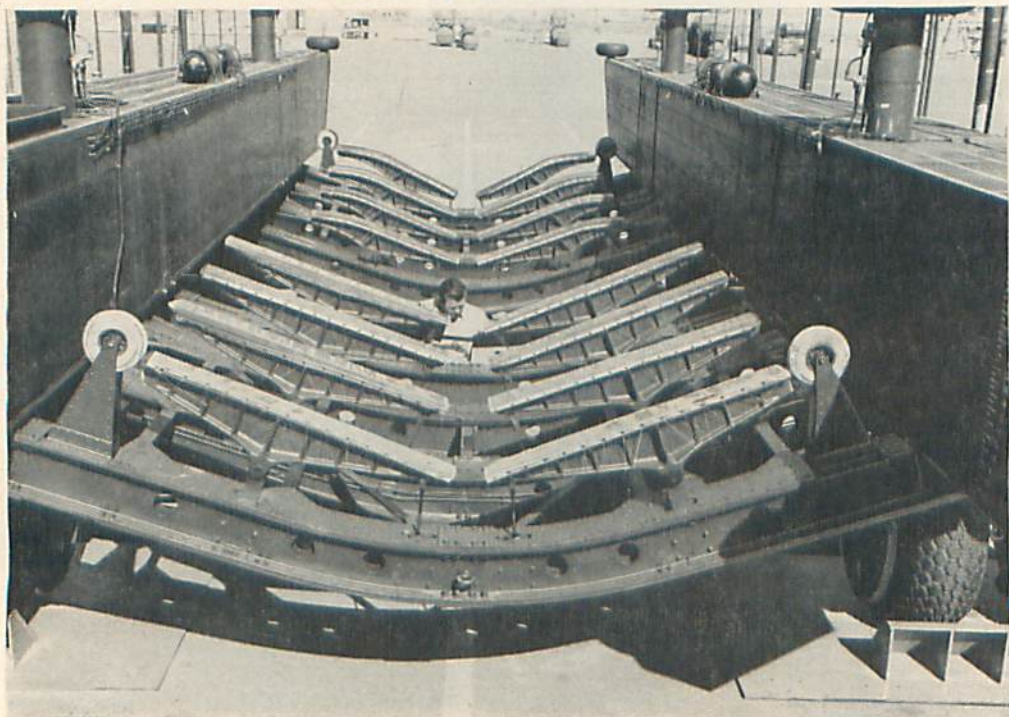
Ready to roll down seaplane ramp to water, Navy's 80-ton R3Y seaplane rides easily on mobile beaching gear

Mobile "Dry Dock" Beaches Giant Seaplane

EIGHTY-TON SEAPLANES are cradled like babies for launching or hauling from the water on an aluminum beaching gear that either floats on air-filled pontoons or rolls on eight immense pneumatic tires.

The beaching gear, which also can serve as a portable dry dock, was built expressly for the giant R3Y series of water-borne transport aircraft made for the Navy by Convair. The series includes such planes

Pivoted pads, covered with rubber and plastic, cradle giant water-based transports to carry them ashore





Air is voided from side tanks to lower beaching gear away from plane. Four outboard motors provide power

as the Tradewinds and the Flying LST.

Designed for disassembled air shipment, the device weighs 25,000 pounds and is powered in the water by four 25-horsepower outboard motors. On land the wheels are driven by compressed air which also fills the flotation pontoons and actuates brakes and power steering.

A series of rubber and plastic-covered pivoted pads in the bed of the cradle is contoured to fit the hull of R3Y flying boats, so that they can be carried without undue strain on any member. The aircraft's turbo-prop engines can be used for both land and water movement.

The beaching gear has its own cockpit and controls, connected with the seaplane cockpit by radio, for coordination of operations. When the aircraft is to be picked up in the water, the gear is maneuvered under it and buoyancy gained as compressed air is released into the pontoons. The reverse procedure is employed in launching.

Four men can operate the mobile beaching gear, as compared to the 18 or more men that are needed with winches and wedges for normal launching or hauling-out operations. ★ ★ ★



Power brakes and steering mechanism are controlled from cockpit in stern of 25,000-pound craft. Radio coordinates movements of beaching gear and airplane

Pontoon flotation gear and immense tires for land travel are clearly seen on beach



Body Style and the V8 Engine Rate High With Pontiac Owners

By Pontiac Owners

I FELT SO PROUD I could have burst," wrote one 1955 Pontiac owner from Portland, Ore. "I got my car the first day they hit Portland and when I drove it down the street everyone stopped to look at it."

Many owners feel the same way about their 1955 Pontiac V8s, our survey shows. We sent questionnaires to 1000 new Pontiac owners, asking them to tell us what they think about the car—their likes and dislikes, the good and the bad.

The top-ranking like was exterior styling. The man from Oregon was only one of many enthusiastic owners.

"I think my car was one of the first, if not the first, on the streets of Akron. It gives a fellow a proud feeling to be stopped on the street, as I have, by motorists who want to see the new Pontiac. I still get a lot of comment in parking lots or any place I stop."—Ohio tire-company supervisor.

"I like its appearance, particularly the front view."—Minnesota salesman.

"Pontiac is the only car on the road with

an individual look." — Indiana teacher.

Pontiac has a new engine for 1955—a V8 of 180 horsepower. The veteran Pontiac six-cylinder engine and straight-eight engine have been retired. The 1955 owners seem pleased. Second on the list of best-liked features was Pontiac's performance.

"I like its power for passing on mountainous roads."—Oregon bookkeeper.

"Responds to gas beautifully. Has plenty of zip. Dealer offered to install a kit to increase horsepower to 200 for about \$35, but I don't think I need it."—Connecticut interior decorator.

"I opened my Pontiac up on a nice road and had it up to 100 with still more to go when another new car passed me with ease. I didn't try to race it. It stunned me for a minute."—Ohio foreman, praising and complaining at the same time.

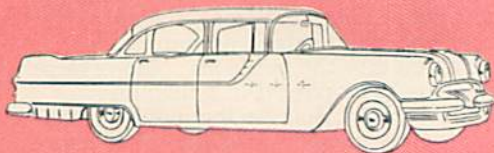
Here Are Some Complaints

Although 25 percent of the 1955 Pontiac

(Continued to page 120)



CONVERTIBLE



FOUR-DOOR SEDAN

CLYMER ROAD TESTS THE PONTIAC

By Floyd Clymer

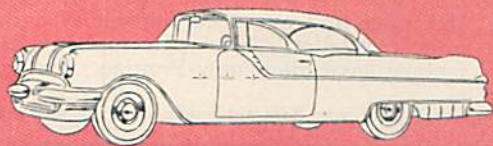
THE CAR used in the Pontiac test was the 124-inch-wheelbase Star Chief Custom Catalina, powered by Pontiac's new 180-horsepower V8 engine with 287.2-cubic-inch displacement.

The test was made under the most varied conditions that I have ever experienced. I left the Pontiac factory at Pontiac, Mich., in a heavy snowstorm en route to Los Angeles (2560 miles). From Pontiac to Kansas

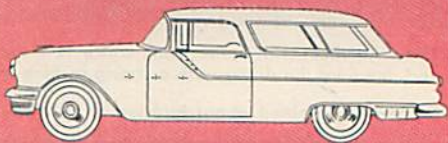
City, Mo., I experienced snow, sleet, hail, wind and rain. I had an excellent opportunity to test the roadability and handling qualities of the Pontiac over snow and ice-covered roads and through a heavy snowstorm across Illinois where roads were so slippery that many cars had skidded off the highway.

The weather was bitter cold. Pontiac's

(Continued to page 262)



HARDTOP



SAFARI STATION WAGON

Best-Liked Features

"The motor is very quiet and has a smooth, surging power that I like."

Massachusetts insurance man

"I like the appearance of the car. It will be stylish for years to come."

Alabama mechanic

Most-Wanted Changes

"I want more miles per gallon. I'm getting 10 miles per gallon in the city now."

Illinois truck driver

"Takes too long to warm up even with a 180-degree thermostat. I drive about 10 miles before the defroster works."

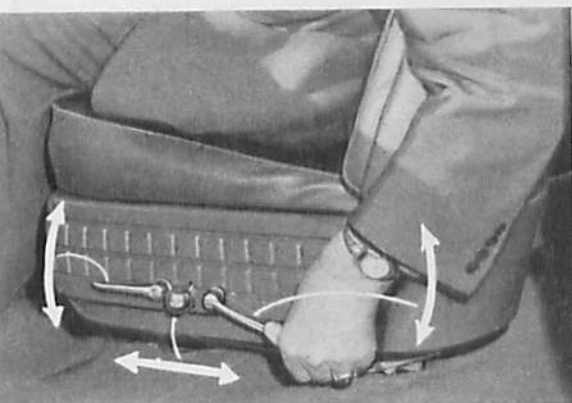
South Dakota contractor



When in the upper position, Pontiac's optional front seat enables short drivers to see over wheel easily



Line demonstrates how much lower the driver sits with seat in low position. The seat is an extra-cost item



Three handles control the seat, which is moved up and down by the driver with a strong rocking motion

owners had no complaints at all, there were others not so satisfied.

The most-frequent complaint (listed by 15 percent of the owners) was that the new Pontiac uses too much gasoline. Second most-frequent complaint was that the Hydra-Matic transmission was jerky in its shifts and noisy in operation (11 percent listed this complaint).

"Uses entirely too much gasoline for the speeds at which it is driven—60 to 65. I get 11.3 miles per gallon on trips."—Kansas sales manager.

"This is the second 1955 Pontiac I have had. The first one used 11 quarts of oil in 700 miles and averaged between 7 and 8 miles per gallon. After my complaints, the factory gave me a new Pontiac. But this

Owners complained about location of ash tray and lighter. Clymer, who does not smoke, didn't mind it a bit



TEST DATA

1955 PONTIAC STAR CHIEF V8
Hardtop with Hydra-Matic

Driver's Blind Spot



Forward vision on Pontiac is about average

Acceleration Test

1/4 mile from zero	19.9 seconds
1/2 mile from zero	32.4 seconds
0 to 30 miles per hour	4.4 seconds
0 to 60 miles per hour	13.8 seconds
Top speed by speedometer	105 miles per hour
Actual top speed about 100 miles per hour	

Economy Test

Constant-Speed Mileage

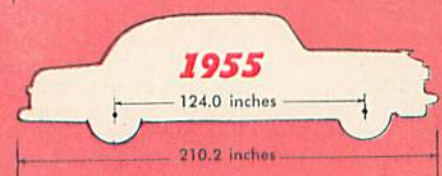
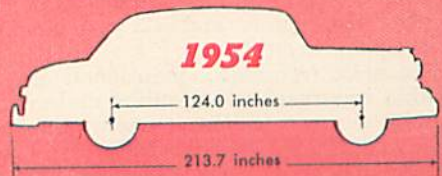
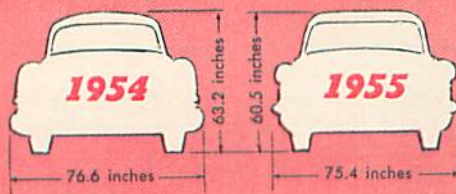
At constant 30 m.p.h.	21.4 miles per gallon
At constant 50 m.p.h.	19.3 miles per gallon
At constant 60 m.p.h.	17.5 miles per gallon
At constant 75 m.p.h.	13.7 miles per gallon

Cross-Country Mileage

Detroit, Mich., to Springfield, Ill.	
Snow and rain	15.9 miles per gallon
Springfield to Kansas City, Mo.	
Sleet and rain	15.2 miles per gallon
Kansas City to Pueblo, Colo. Dry highways,	
long, level stretches	18.2 miles per gallon
Pueblo to Los Angeles, Calif. Long open	
stretches and desert	17.1 miles per gallon
(Both regular and premium gasoline used)	

Comparison with 1954 Pontiac

Exterior dimensions of the 1955 Pontiac show that it is smaller over-all than the '54 car



The above data comes from Clymer's road test of the Pontiac. But a road test alone cannot tell the whole story. To bring you the whole story, PM polls 1000 owners and summarizes their opinions in the monthly Owners Report

from fouling. I have had two sets of plugs in 1550 miles."—Illinois toolmaker.

"Carburetor was porous, had to be exchanged."—Michigan engineer.

"A good engine but has a few bugs in the valve lifters. Sometimes it idles rough. Sometimes the tappets are noisy. Fuel pump is very noisy."—Illinois hospital aide.

"Only trouble I had was a noisy harmonic balancer. It was remedied by brazing the rivetheads."—Michigan bus driver.

"Motor too noisy. Vibrates. Roars like an airplane engine when doing 60 or better."—New Jersey truck driver.

What Would They Change?

When asked what single change they would most like to have made in their Pontiacs, 27 percent of the owners replied: "None at all."

But there were 9 percent who wanted better gasoline mileage, 7 percent who wanted a more efficient heater, 6 percent who wanted the automatic transmission improved and 5 percent wanted a second ash tray on the dashboard.

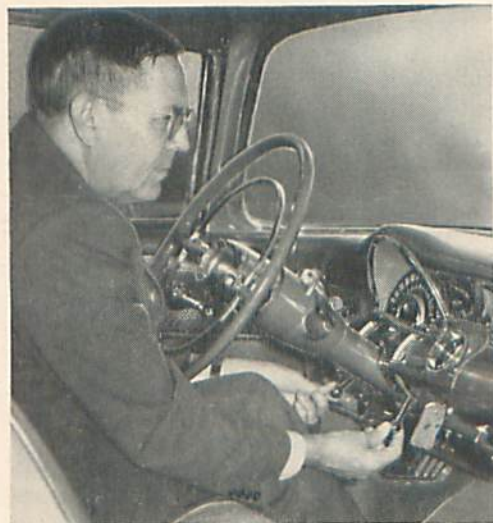
"Should have a better heater and defroster. Heater is very nearly useless. Defroster and heater don't work well separately. If heater is in normal operation, cold air blows through defroster into your face."—Michigan sales manager.

"It comes with a 155-degree thermostat and does not allow engine to warm enough. I changed thermostat myself, but heater still does not throw enough heat forward to keep feet and ankles warm."—Michigan salesman.

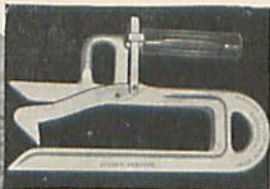
"Windshield defroster covers too much

(Continued to page 254)

Lever-type heater controls are convenient, but one owner hurt his knee on one of them in an accident



Carrying Tool Grasps Blocks



Concrete blocks can be carried easily without gloves when a lightweight lifting tool is used. The jaw of the tool is thrust through the hollow core of a building block

and a hook swings down to grasp the block's edge. By pushing a plunger with his thumb the user can release the hook and drop the block. The 23-ounce aluminum carrier is surmounted by a plastic handle and a metal ring used for hoisting purposes.



Adhesive Sprayed From Can Joins Nonmetallic Surfaces

Sprayed like insecticide from an aerosol bomb, a new adhesive called Bonad has been developed in Canada. Bonad is said to be completely waterproof, and to form a bond at the touch of a finger, even before it dries. The spray adhesive sticks to most nonmetallic substances.

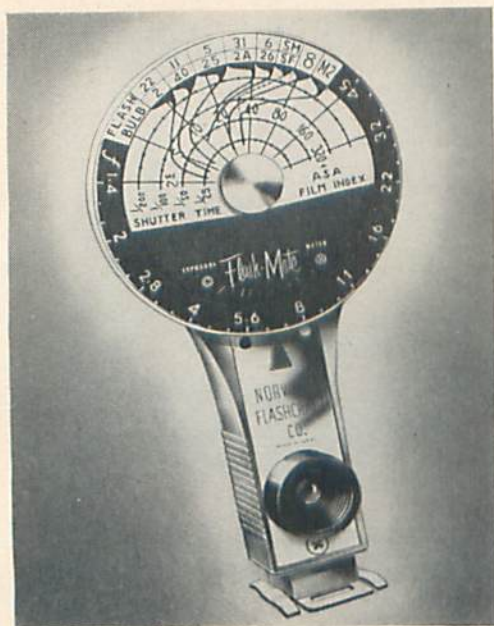
German Conveyor Makes Sharp Turns While Climbing Steep Grades

Radical construction makes possible a German conveyor belt that snakes around curves and up steep grades. It consists of trough-shaped, bent-steel plates which are rubber clad on the top side and connected by elastic cross folds. Each plate is supported by a carrier with rollers riding in a channel on either side. The carriers are fitted to a steel pulling chain.



Drop in Ocean Temperatures Indicates Earth Cooling

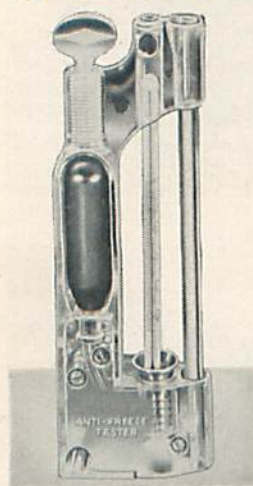
Temperate-zone cities such as Chicago, Berlin and Moscow may be buried under 1000 feet of ice in a comparatively short time, geologically speaking, according to Cesare Emiliani, of the University of Chicago. Emiliani reported that long-range studies based on measurement of oxygen forms in fossil microorganisms indicate the earth is getting colder. The temperature of its oceans has dropped 14 degrees in the last 30,000,000 years. The scientist predicted that glaciers may cover our cities in as little as 10,000 years.



Exposure Meter for Flash

Developed specifically for flash photography, a new exposure meter is designed to avoid wastage of film and bulbs. First, shutter speed, film number and bulb number are set on the meter's dial before the coupled range finder is focused on the subject to compute automatically the f-stop for the shutter. Only 4¼ inches long from the dial end to the chrome foot, the Flash-Mate is easily attached to most cameras.

Pocket-Size Antifreeze Tester



Antifreeze can be tested for its freezing temperature with a new pocket-size instrument. The tester uses carbon dioxide from a fire extinguisher to freeze a thimbleful of the antifreeze. The temperature is read on a thermometer immersed in the solution. Any type of antifreeze including alcohol can be checked with engine cold or warm.

Valuable concentrations of germanium, the metal used in transistors, have been found in the ash of Kansas coal.

Live Shell Turns Up—

ABOUT 200 YEARS ago, in August 1757, General Montcalm with his French forces and Indian allies attacked the British at Fort William Henry during the French and Indian War. Just before the attack, a French soldier touched off a mortar. The shell lobbed into the fort.

The five-day attack ended with the French overwhelming the fort. Many of the British prisoners were massacred by the Indians, and the fort was burned.

Through the years the ruins, near Lake George, N. Y., rotted away until the fort disappeared from sight. Recently a corporation was formed to reconstruct the frontier outpost, and archeologists started exploring the site.

Ernest Clute, a staff archeologist, was digging in what had been the cellar of the east barracks when he came across a large iron sphere. It was the mortar shell which the unknown soldier had fired almost 200 years before.

The shell lay upside down. The original seal was still intact and right over it was hair and what appeared to be a portion of a scalp.

Officials didn't touch the shell, but sent samples of the hair to the New York State Police Scientific Laboratory. A report came back that the hair, sure enough, was human, "black and brittle."

Soon a call went out to Capt. Robert Swarthout of the United States Army, stationed at Fort Jay, N. Y. In the course of his duties, Captain Swarthout had deactivated 1000-pound bombs in Berlin. He, along with Sgts. Sylvester E. Berki and Moultrie D. Brown, showed up at the ruins of Fort William Henry to take part in one of the strangest deactivation projects in Army history.

The men first cleared a safe area around the ancient shell. Then they broke the seal. The black powder beneath the rosin and tar was moist, but Captain Swarthout soon made the amazing discovery that the powder in the middle of the shell was dry. It had remained a live shell through its 200-year history!

What the hair was doing on the shell is anybody's guess. One theory is that the missile arched into the fort, hit a soldier on the head and bounced into a pile of sand, which extinguished its fuse.

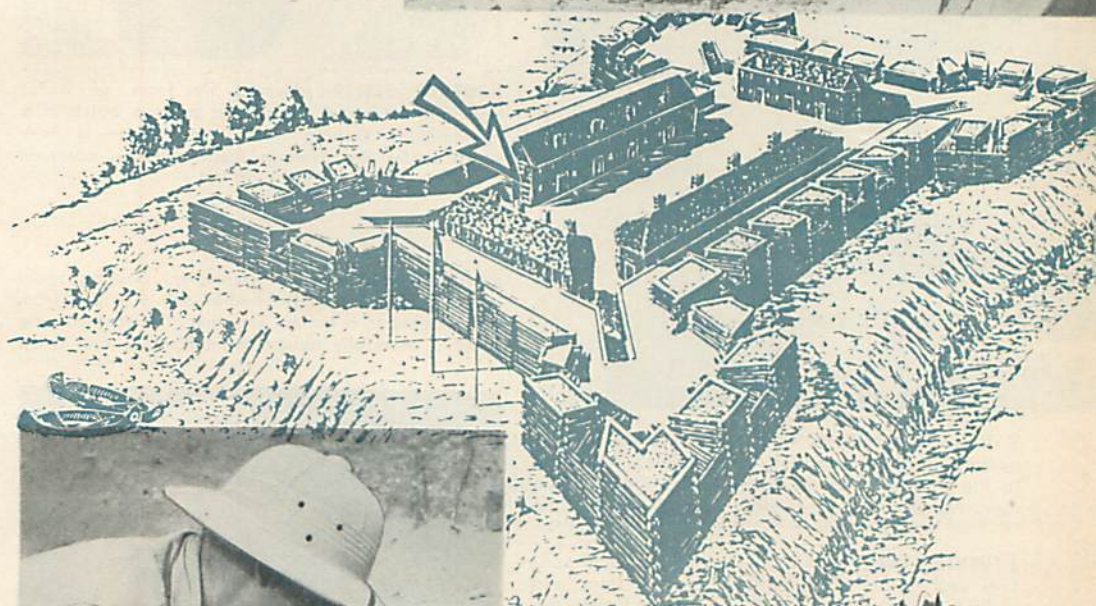
The mortar shell, now thoroughly deactivated, rests in the Fort William Henry Museum, not more than 20 yards from where it lay, waiting to explode, for some 200 years. ★ ★ ★

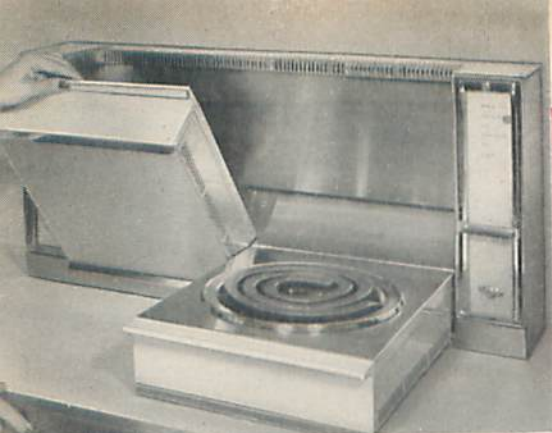
After 200 Years!

Right, Army team called in to check the shell soon found that it was still alive and could explode after 200 years. Men used a screwdriver to take out the powder. Black powder used 200 years ago was ignited only by spark or flame

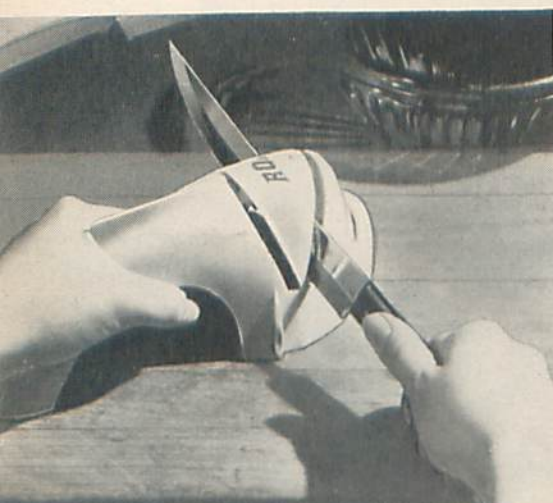
Sketch below shows the fort as it appeared in the days of the French and Indian War. Arrow points to the spot where the live mortar shell was found

Bottom, staff archeologist found the shell while digging through the sand that covered the fort's ruins. Object atop shell is a tomahawk unearthed just above missile. Lower-right drawing shows mortar used about 200 years ago



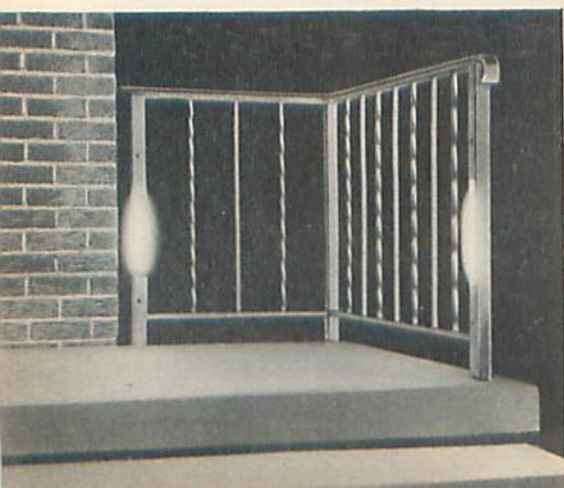


↑ **COOKING UNIT** with two fold-back hot plates, one six and one eight inches in size, can be placed on any counter top in kitchen, used in conjunction with a built-in oven. Fold-back feature saves space
Frigidaire Div., General Motors Corp., Dayton, Ohio



↑ **SHARPENER AND HONE** for knives is operated by passing blade through slots several times. According to the manufacturer, it makes knives sharper than new. No electricity is needed. Job takes little time
The Alden Speare's Sons Co., 130 Sixth St. Cambridge 42, Mass.

↓ **TUBULAR LAMP** used as a structural part of railings and fences gives sure footing on steps and walks, is decorative as well. Inside the house, the bulb can be used as a fixture on a room divider
Postlite, Inc., Indiana and Illinois St., Des Moines, Iowa



WHAT'S NEW FOR Your Home



↑ **POTATO PEELER** powered by force of water from kitchen faucet cleans and peels a batch in a few minutes. Rushing water spins turbine in base which scrubs the peelings from tumbling potatoes
American Standard Co., Plantville, Conn.

↓ **CAN OPENER** forms a convenient pouring spout in the can it opens. It handles any size can from a two-ounce to a gallon container. The easy-pouring spout is especially handy for milk, juice and syrup
Keyes Davis Co., Battle Creek, Mich.

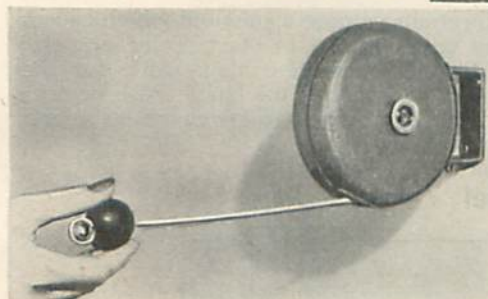




↑ **SHOESHINE KIT** for home use has a tray to hold shine supplies and a step on which to rest shoe being polished. Wire brackets permit the polishing cloth to be looped around toe of shoe to end stooping.
Metro Mercantile Co., 4226 Melrose Ave., Hollywood 29, Calif.

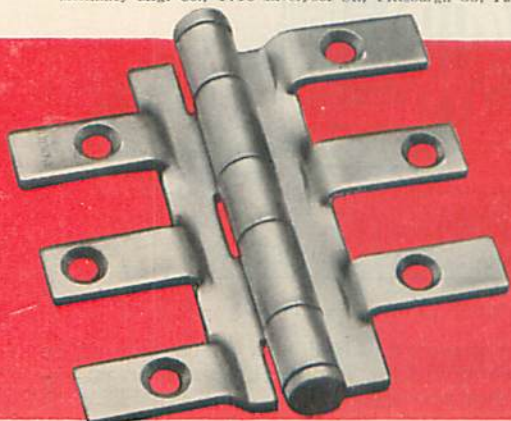


↑ **HOLDER** for fruits and vegetables swings down from vertical position in refrigerator door to permit loading or unloading. When it is folded up into the door its transparent side allows view of contents.
Frigidaire Div., General Motors Corp., Dayton, Ohio

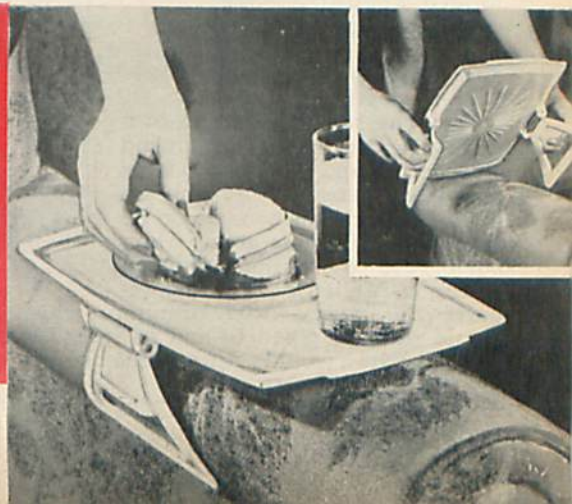


← **CLOTHESLINE REEL** keeps 18 feet of plastic-nylon line ready for instant use. The line stays taut with the aid of a lock ring, snaps back into its holder when released. Reel folds against wall.
Cordomatic Div., Vacuum Cleaner Corp. of America, 17th & Indiana Ave., Philadelphia 32, Pa.

↓ **HINGE** mounts on door without mortising. Leaves of the hinge mesh into a single thickness of metal when the door is closed to give 1/8-inch clearance. Mounting a door takes a screwdriver and 16 minutes.
McKinney Mfg. Co., 1715 Liverpool St., Pittsburgh 33, Pa.



↓ **TRAY** for refreshments grips chair arm. Spring clamps retain a firm grasp of arm. The plastic tray is eight by twelve inches, holds a small plate and a glass. Tray can also be clipped to thigh for writing.
Bakelite Company, 260 Madison Ave., New York City 16





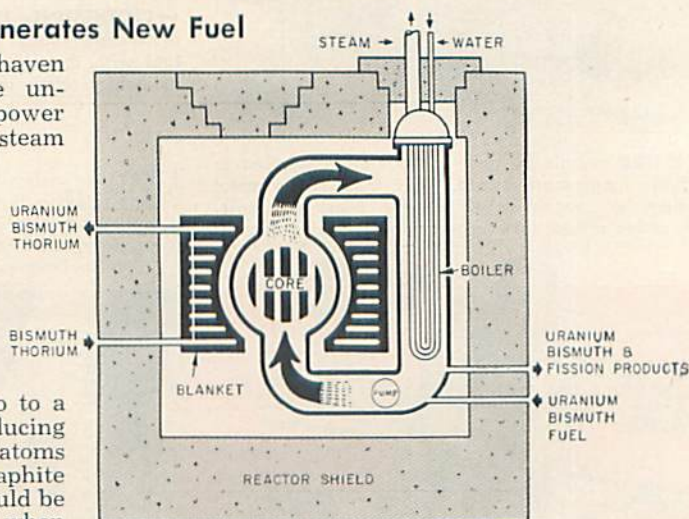
Winch-Equipped Truck Controlled by Shouts and Push Buttons

"Honey," a service truck operated by Californian Frank Toles, starts its engine when its name is called. A voice pickup under the truck, consisting of a thin rubber membrane stretched over a disk, is adjusted to vibrate to Toles's shout of "Honey." The

vibrations actuate a solenoid which causes the truck engine to start. Toles has also patented a remote-control cable for the winch mounted on the truck. Push buttons on a handle raise and lower the boom and control the winch.

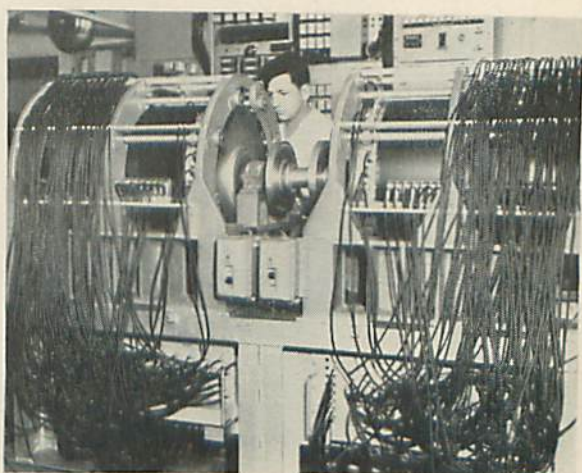
Three-Way Reactor Generates New Fuel

Two scientists at Brookhaven National Laboratory have unveiled a three-way atomic-power system. It would generate steam for electric power, "breed" new fuel for itself, and pump liquid atomic by-products to other areas for processing. In the perforated graphite core, splitting uranium 233 atoms would create heat, converting water into steam in an external boiler. The steam would go to a turbogenerator, thus producing electric power. Thorium atoms circulating through a graphite blanket around the core would be "bred" into uranium atoms when bombarded by fission-produced neutrons. Melted salts would remove the newly bred uranium, which would then be piped to add as fuel. Bismuth-thorium would return to the blanket.



CORE OF LIQUID-METAL-FUEL REACTOR

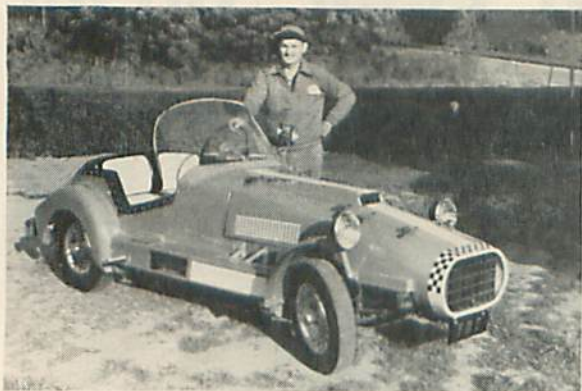
By-products of fission in the core would be removed from fuel continuously in an exterior processing area.



Electronic Machine Speeds Flight Information to Area Offices

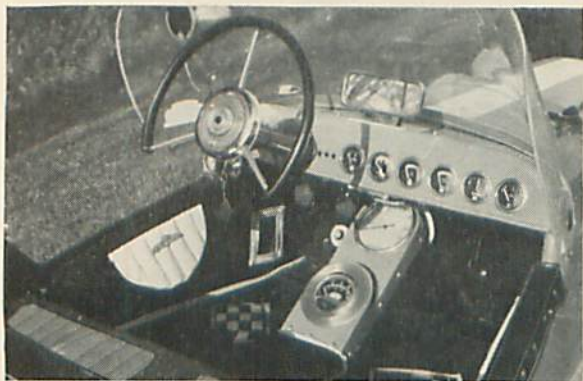
American Airlines has turned to an electronic machine to provide fast, accurate flight information to all its offices in the New York area. The machine, the Magne-tronic Reservisor, is already in use, handling reservations automatically. In its new utilization, information on all flights, incoming and outgoing, is fed into the whirling drum that is the machine's "memory,"

and is then available at any airline office in the area. To obtain the information, an agent has only to push a simple combination of buttons on the branch-office key-board. The answer is returned in flashing lights. Immediately available flight information allows the agent to answer queries at once instead of checking bulletin-board postings.



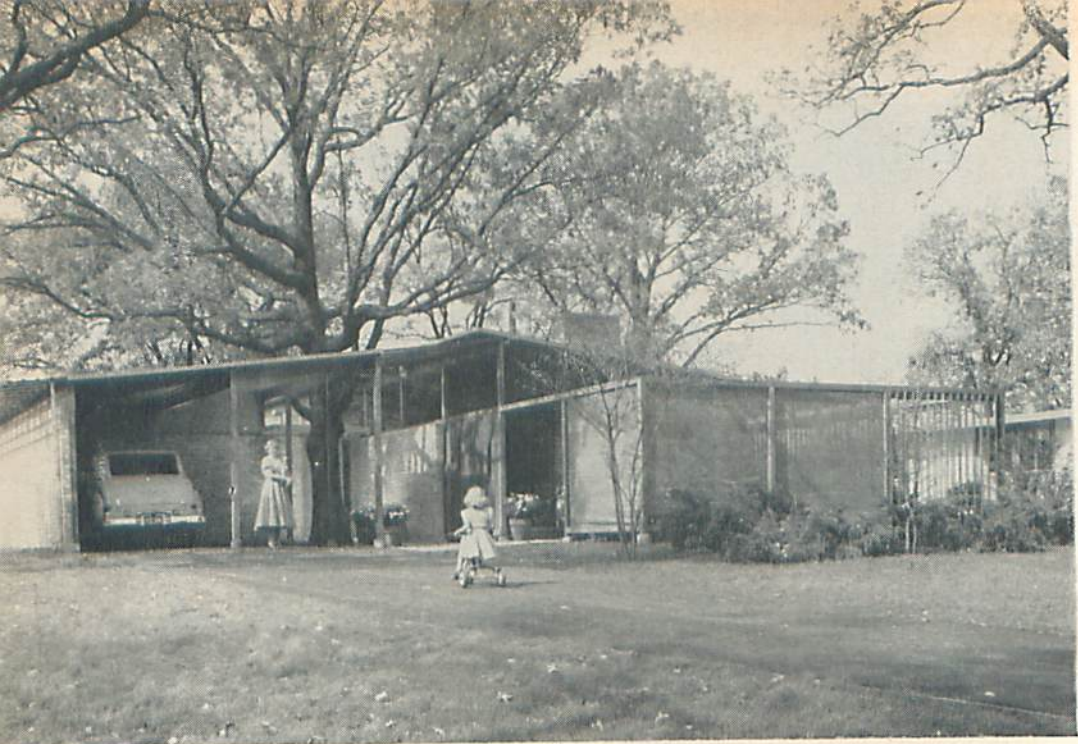
Crosley Convertible Becomes Sports Car

Few persons realize that the small, trim sports car (shown at left and below) owned by Fred Wheeler is a former Crosley. The car started out in life as a 1947 Crosley convertible. Wheeler hopped up the motor, substituted wire wheels, added instruments and made radical changes in body silhouette and design.



Scum in Rice Paddies Adds Nitrogen to Soil

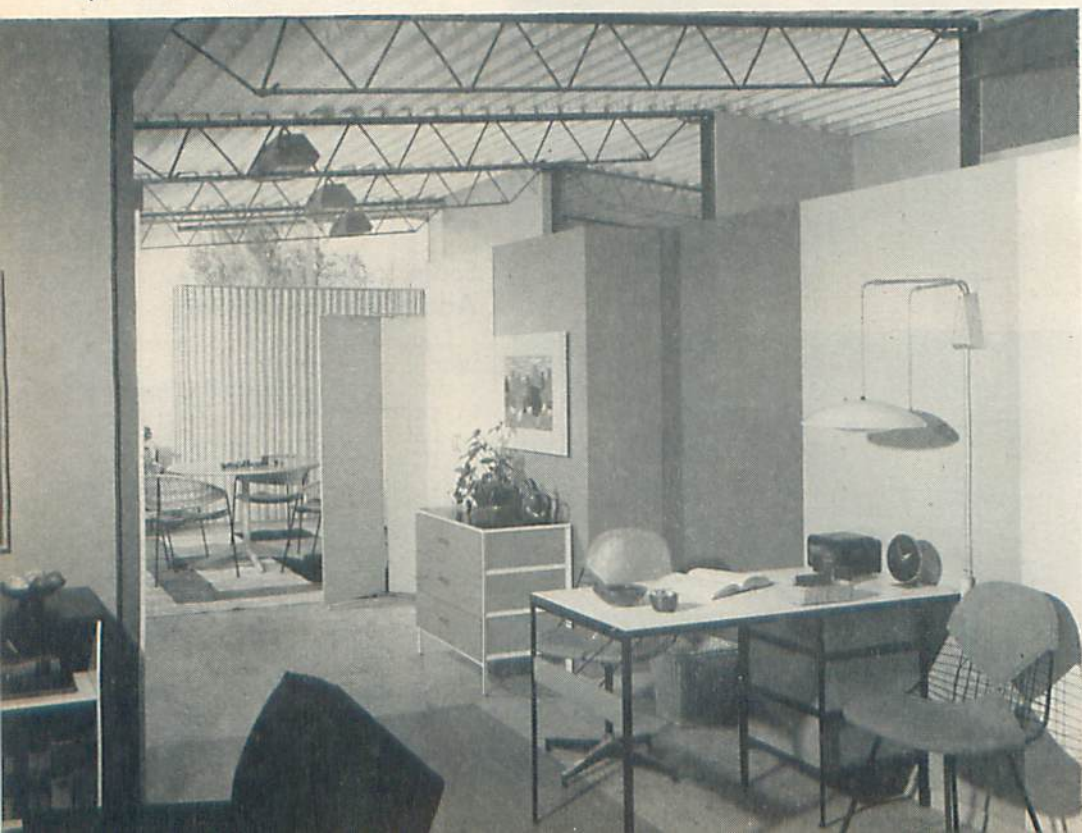
Instead of being a nuisance, the blue-green scum that forms on the water of rice paddies now appears to promote fertility. The algae snatch nitrogen from the air and fix it in a form usable by plants. Their nitrogen-fixing ability is 200 times the rate previously estimated, according to Dr. Daniel I. Aron and Dr. Mary Bell Allen of the University of California. The scientists suggest that the microscopic plants be added to rice fields. Such a method could add to the rice land much more nitrogen than does fertilizer.

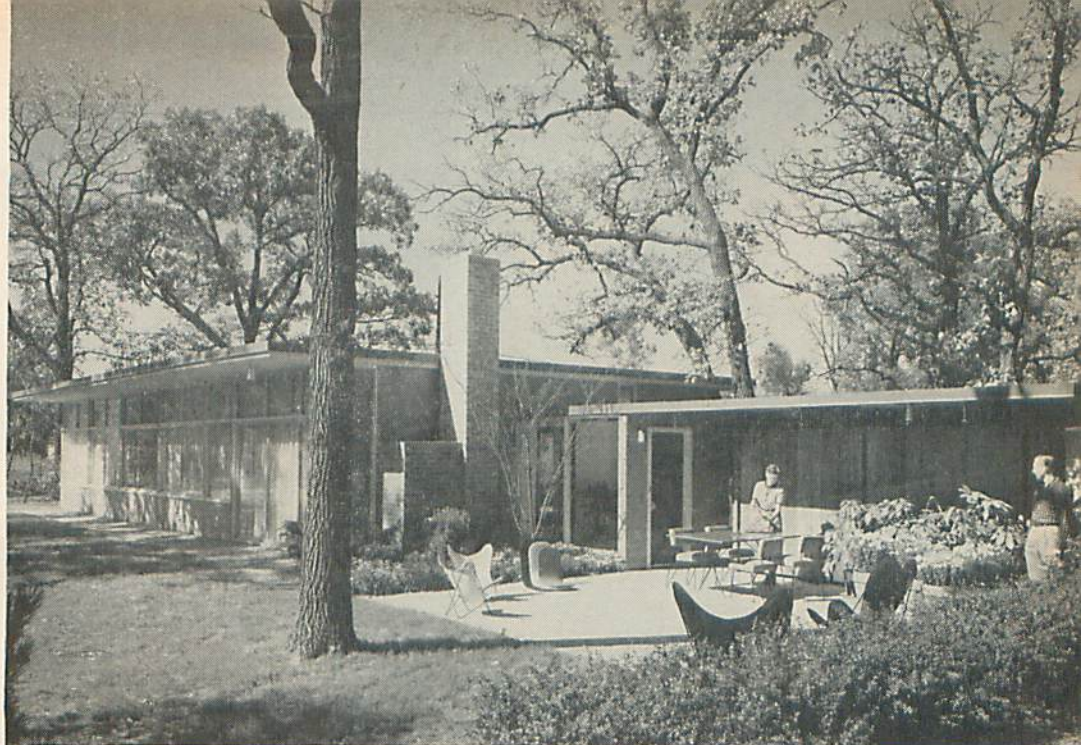


Courtyard built around old oak is typical of the careful, advanced planning to be found in Research Village

Homes That Look Ahead

Open-truss steel joists and steel roof decking they support are left exposed as part of decorating scheme



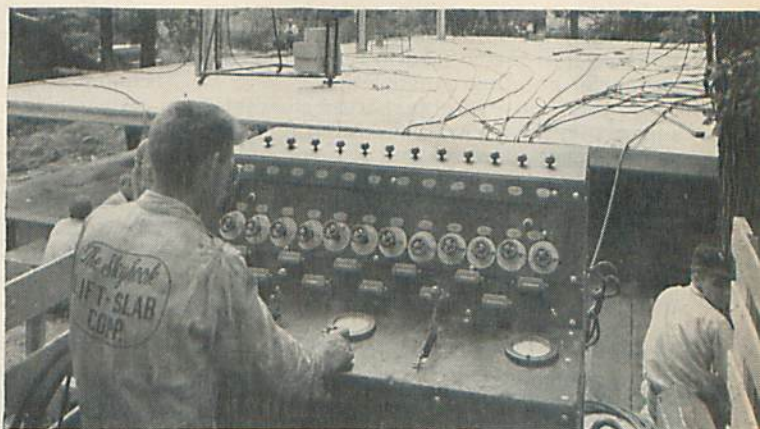


Texas-designed house has concrete lift-slab roof, construction feature seldom found in residential building

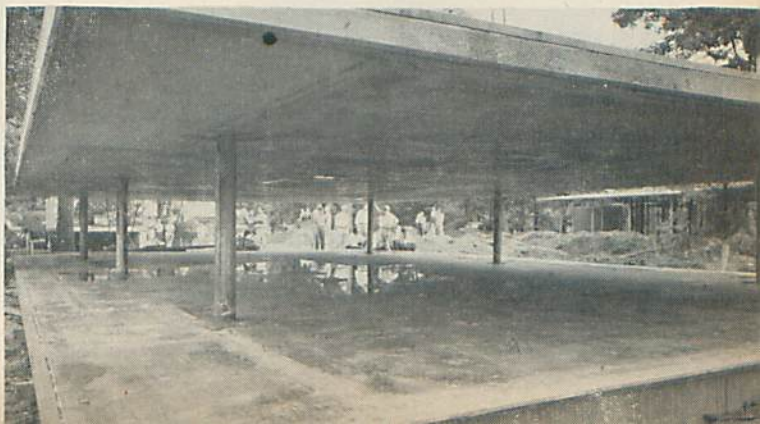
WHAT'S a good recipe for the home of 1965? Six architects were challenged to put the ingredients together for homes that would be modern in materials, style, comfort and efficiency 10 years hence—at a time when the current building boom may have worn away and the construction industry may have to sell its products.

The results are visible today in Research Village: A group of attractive, sometimes unconventional homes in an oak grove some 50 miles northwest of Chicago. The project was sponsored by the United States Gypsum Company, and architects representing six regions of the United States were commissioned to come up with original designs unfettered by conventional materials and methods.

In one house the new lift-slab technique was used, the concrete-slab roof being poured on the ground and then jacked



Steel posts are set in concrete floor and roof slab is poured in forms around them. When set, floor is hoisted by hydraulic jacks mounted atop each post and operated electrically from central console switchboard. Above, console control keeps roof level during raising process (below)





A true tri-level, this Research Village house has living room at camera level (left), bedroom above and kitchen and dining room below. Bedroom can be shut off by sliding wall. Glass end wall seen in both pictures is faced southeast for morning sun

up and anchored by welding steel collars to the six steel load-bearing pillars. All the walls are curtain walls; none bears any load. This novel method in home construction was first introduced in recent years in industrial building construction.

Another house has open-truss steel joists supporting its steel roof decking, the joists remaining exposed instead of being hidden under lath and plaster. Ribbed-steel roof decking was used in several Research Village homes.

Other innovations were the use of gypsum plank in floors and ceilings in place of flammable wood or heavier concrete, and

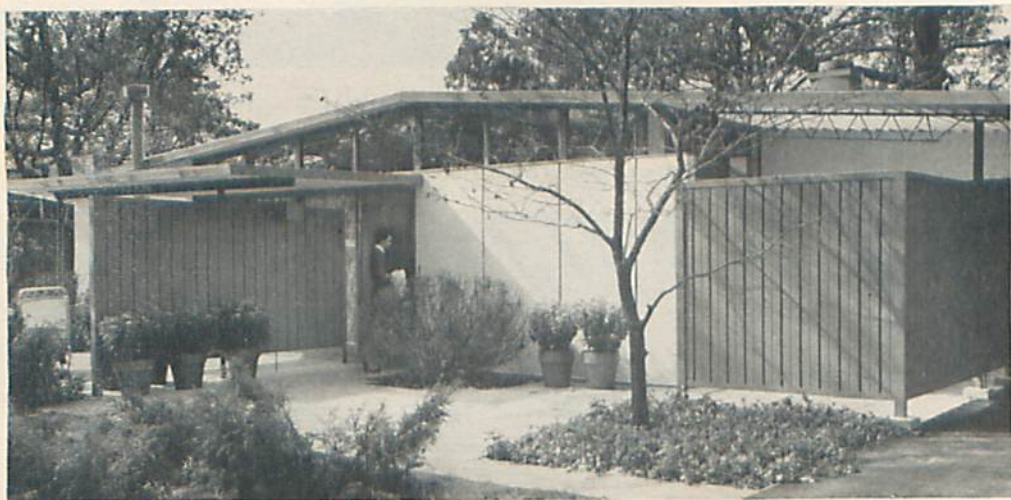
electrically heated driveways and walks that relegate the snow shovel to the past.

All Research Village houses are designed for possible mass production. Some, like the lift-slab-roof house, cannot be built economically in single units.

At the same time the architects were cautioned to allow for enough variation to avoid repetition in community developments. Each one of the houses can be built in a variety of floor plans and with various exteriors.

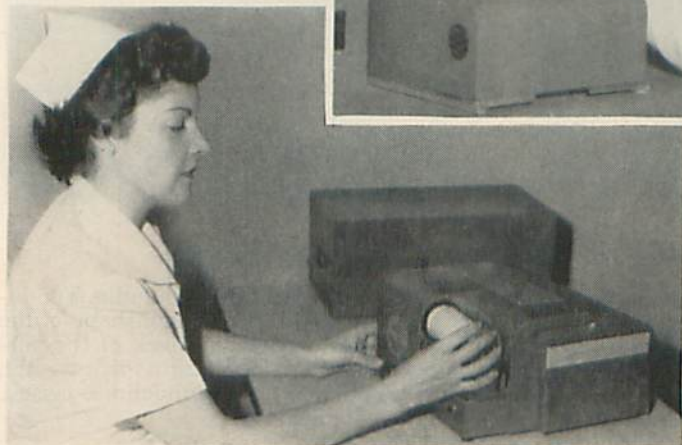
But basically the homes were not designed for exact reproduction. They are idea houses. ★ ★ ★

Steel roof decking is employed here not only overhead, but as screening fence, an integral part of house plan



Facsimile System For Prescriptions

Prescriptions electronically transmitted from doctors' offices to an Alhambra, Calif., pharmacy are saving time for the physicians' patients. Using Western Union's Telefax facsimile system, the druggist receives a pre-



scription exactly as written less than three minutes after it is placed on a transmission cylinder several miles away. With the system, the prescription can be ready for the patient long before he gets to the pharmacy. Doctors in various sections of Alhambra have their own office transmitters.

Model-Railroad System Serves Real Purpose in Carrying "Hot" Cargoes

Scientists at the Atomic Energy Commission's huge Hanford, Wash., operation play with electric toy trains every day. But the play is deadly serious, and the trains transport beakers, containing highly radioactive materials that would be dangerous to handle, over trackage with enough remotely controlled switches to be the envy of any juvenile train fan. General Electric engineers geared down and lowered the center of gravity on the standard Lionel Lines locomotives, and also designed special cars and loading equipment.

Dehydrated Mashed Potato

To potato chips, French fries and home fries can now be added "potato flakes," a new kind of dehydrated mashed potato. Described as tasting somewhat like a baked potato, the new product was developed by U. S. Department of Agriculture scientists, who maintain the flakes can rapidly be made into mashed potatoes.





Lobster-Claw Life Preserver Facilitates Rescue Towing

Somewhat resembling a gigantic lobster claw, a new inflatable life preserver is made of Neoprene rubber and aluminum. A Neoprene envelope is stretched over an aluminum frame and inflated by oxygen from

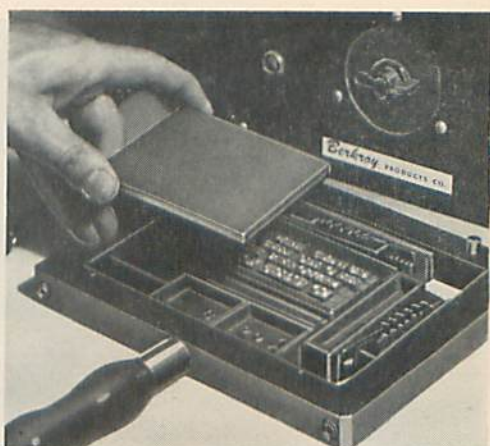
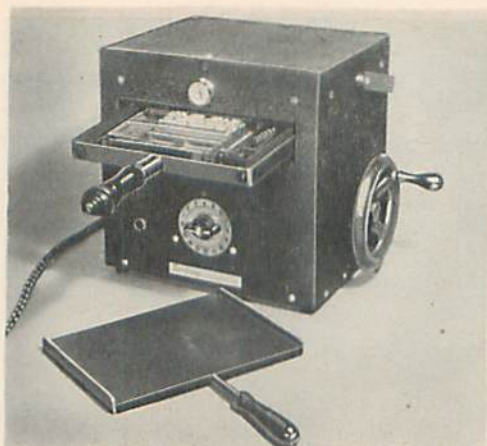
cartridges in the preserver handle. The inventor contends that the claw shape of the preserver fits around the neck of the person being rescued, facilitating towing while keeping him afloat for an indefinite period.

Lantern or Midget Stove Fueled by Disposable Propane Cylinder

Propane gas fuels a bright-burning lantern and a midget cookstove recently introduced. A disposable fuel cylinder forms the base of each. The lantern light is adjustable from a soft glow to a brightness equaling a 100-watt bulb and lasts from 9 to 20 hours on one fuel cylinder. The clean-burning propane gas has no odor or smoke and leaves no carbon deposits on cooking

utensils or lantern chimney. The one-burner stove, which can "perk" eight cups of coffee in six minutes, will cook three meals a day for five days for one person on one fuel cylinder. Both lantern and stove are equipped with the same fuel unit, which has a self-sealing check valve and a safety relief valve. The cylinder can be detached or stored with no danger of leaking gas.

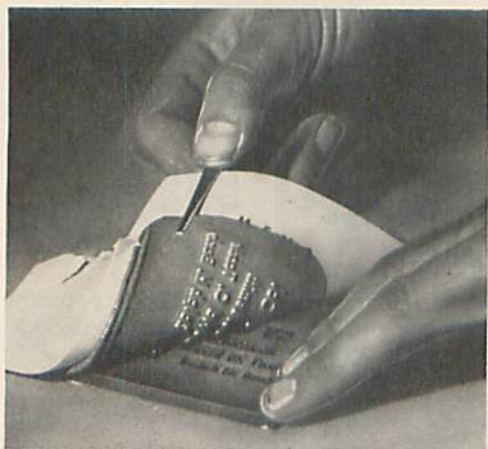




Complete press occupies little space. Right, Bakelite slab is placed on type to form the plastic mold

Midget Press Produces Rubber Stamps in Only 20 Minutes

Finished rubber stamp is peeled from the Bakelite plate. Machine makes stamps of commercial quality



Rubber stamps can be produced in the home workshop by a little press that takes up less than a cubic foot of space. The machine is able to exert two tons of pressure, enough to produce a five-inch-by-seven-inch rubber plate or 30 individual rubber stamps at a time. It weighs only 74 pounds and is equipped with a vulcanizer slide, a chase to hold type, a timer and thermostat. A Bakelite slab is used to make a mold of the type and rubber is poured into the Bakelite mold to form the rubber stamp. The aluminum platens used in the machine reach the operating temperature of 325 degrees in a few minutes. The unit was designed by a schoolteacher and tested by 1600 eighth-grade students. After tests showed that an eighth-grader could complete a stamp of commercial quality 20 minutes after setting the words in type, production was launched.

Parking Heaters in Sweden Keep Automobile Engines Warm

Motorists in Solna, Sweden, hitch their cars to curbside heaters that keep engines warm for easy starting. A cord from an electrical outlet that looks like a parking meter connects to a heater under the hood. Use of the heater for an entire season costs only \$20.

Canadian Pacific Airlines starts weekly one-stop, 18½-hour, "over the pole" service between Vancouver and Amsterdam in May.





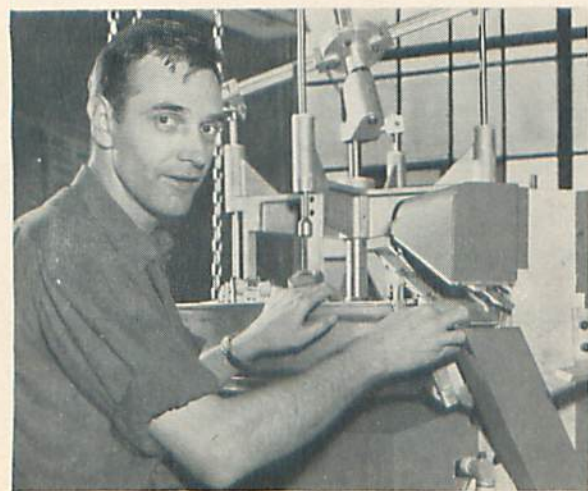
Ford worker Michael Bronik hit a \$1500 jackpot with his flexible gum hammer for windshield installation

Ideas That Paid Off

By Joseph Nolan

BURROWING THROUGH a pile of suggestions submitted by employees of the Civil Service Commission in Washington, Chairman Philip Young came across

Eastman Kodak awarded Bruce Steele \$1200 for suggesting this machine that pulls bent film spools from the assembly line



one from analyst John Overholt proposing that his own job be abolished. Young was surprised but intrigued, and decided to take Overholt up on the idea. So the analyst's job and the Performance Rating Section he headed were eliminated. The first-year saving to the taxpayers in lower overhead costs added up to \$12,000. And Overholt? He got a cash award of \$275 for his suggestion—and a better job on the Board of Appeals and Review.

Overholt is typical of the thousands of workers who are taking advantage of the increasingly generous bonuses offered by government and industry for telling the boss—through the suggestion box—how to run his own business. Last year, for example, the estimated 8000 suggestion systems in factories, business offices and government agencies handled more than 2,000,000 suggestions from employees, found about one out of four worthwhile and paid out around \$15,000,000 in awards.



John Kelley, in tank, decided it would be easier to paint inside of inside-out tank. Northwest Orient Air Lines agreed

In today's buyers' market, ideas that will boost production, step up efficiency and save money are more than ever at a premium—and employers are bidding high for them. Recently, Libby, McNeill & Libby sent a check for \$5000 to a workman who showed them a better way to put the squeeze on pineapples, increasing pineapple-juice production by 95,000 cases a year. AiResearch Manufacturing shelled out \$7777 to a machinist for his idea on a new gadget for turning out intricate aircraft parts that previously had to be hand-made. Corning Glass split \$9653 between two employees who suggested an improved method of freeing television funnels from their molds. (One of the two promptly went out and blew himself to a new TV set.)

The payoffs usually are based on a fixed percentage of the savings that result from prize-winning suggestions. Businessmen and government administrators estimate that for every dollar paid out for employee ideas, about \$10 comes back to management in the form of savings. The Budget Bureau in Washington calculates that during the eight years the Federal Government's suggestion program

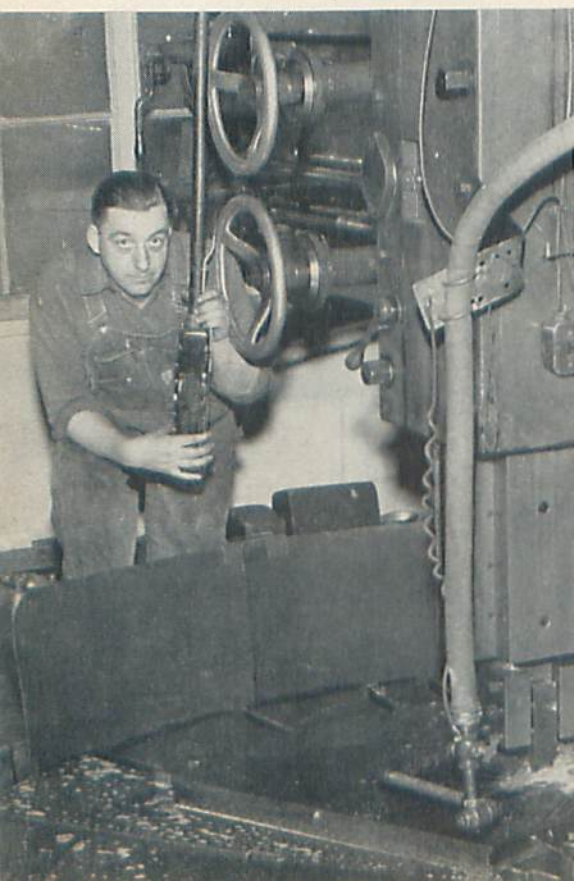
Heat-reflecting white color of airliner tops is result of suggestion that won prize for a United Air Lines mechanic





Bruce Drake (top right) was rewarded for suggesting vents in hot slag chutes would cut explosion danger

Suggestion that improved machining accuracy won top \$5000 General Electric prize for Rollo "Doc" Miller



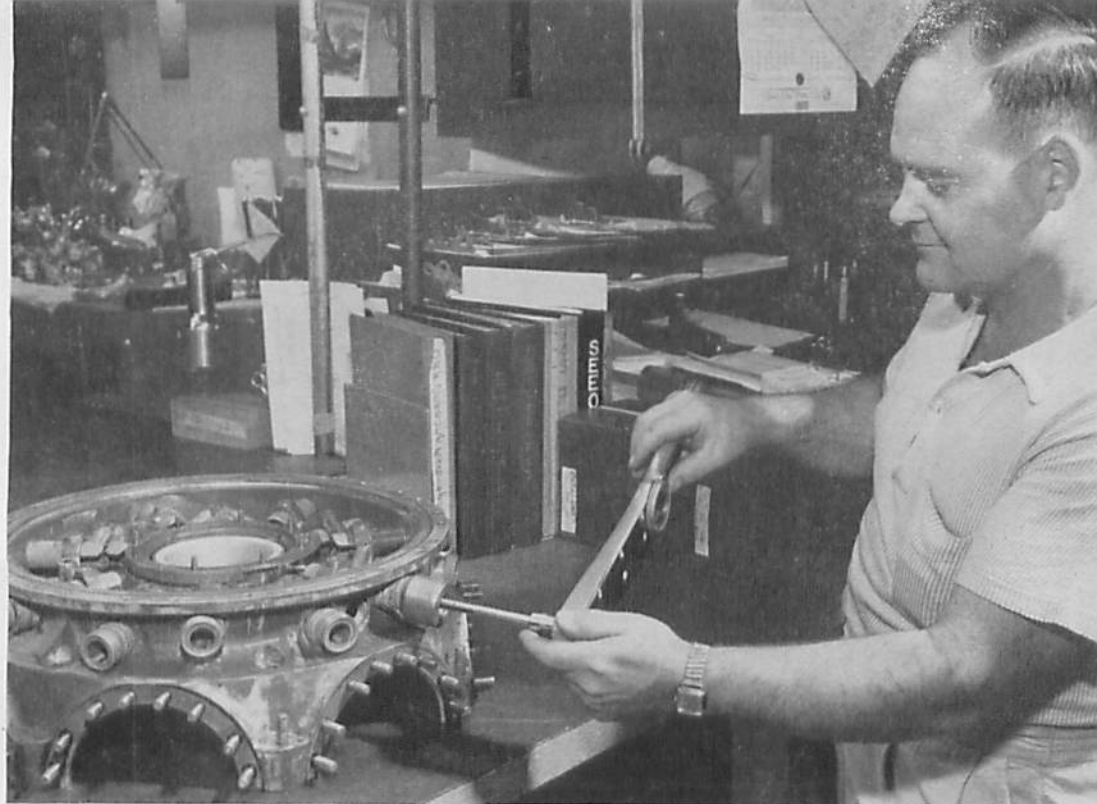
has been functioning, it has saved the taxpayers in the neighborhood of \$200,000,000.

Not long ago, President Eisenhower showed his high regard for suggestion systems by signing into law a measure hiking the top award for government employees' suggestions from \$1000 to \$25,000. Said the President:

"A systematic means of inviting each person to contribute his ideas for the conduct or improvement of the business, industry or government which employs him excellently exemplifies our respect for the individual and his ideas. Such systems encourage initiative and tap those human resources of knowledge and creative ability that exist wherever free people work."

Of course, government and industry hire "efficiency experts" and "superspecialists" to hunt for short cuts and money-saving gimmicks. But the experts can't think of everything. That was amply demonstrated a while back in Huntington, W. Va. Management engineers estimated that it might take as long as three years to plan conversion of the Chesapeake and Ohio Railroad's steam-engine shop into a diesel-engine repair depot. Then along came an enterprising group of C. & O. employees, working on their own, who figured out in just six weeks a plan which was adopted.

Charles F. Kettering, the automotive genius, summed up the situation neatly: "The man who says it can't be done is al-



Simple idea of using torque wrench for tappet-guide check won award for Lyle Canady from airline employer

ways being interrupted by some other guy who is doing it."

Many employee suggestions involve changes so simple that the experts have overlooked them completely. A woman worker at Remington Rand suggested that the company was wasting money and slowing down production on a certain type of business machine by drilling holes that had no earthly use. A checkup by the experts showed she was right; the operation had been carried over from a previous model.

An employee of the New York State Department of Public Works suggested that old steam radiators, which had begun to leak around the bottom, be turned upside down. The scheme added about twenty years to the life of the radiators and won the suggester a \$500 bonus.

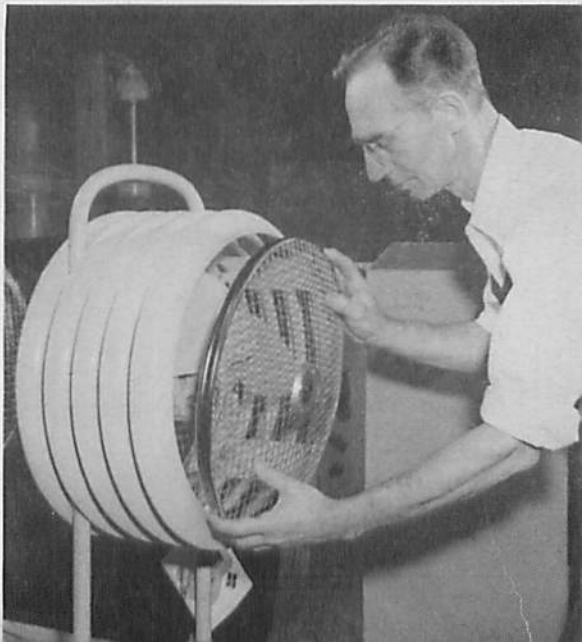
How do workers get their ideas? In many different ways. Some are born of unpleasant experiences. Mrs. Julia Jones, a janitress at the Lincoln-Mercury plant in Wayne, Mich., got her inspiration for a "diaper stock pile" after twice being called to the lounge by frantic customer-parents to assist in emergencies. A United Air Lines mechanic did some thinking after his wife got sick sweating out a delayed take-off in the midsummer sun. He proposed that the airline paint the tops of its planes a sun-reflecting white; this made them eight to ten degrees cooler inside and

other lines immediately followed suit.

Sometimes bright ideas are just a matter of self-defense. Take the case of John Kelley, a mechanic with Northwest Orient Air Lines. There was one job he hated—painting the inside of rubber fuel tanks. To do it, he had to crawl inside the tank. Then one day he decided it would be a lot

(Continued to page 228)

William Wroblewski earned an extra \$1300 from Westinghouse for this better-fitting fan safety screen

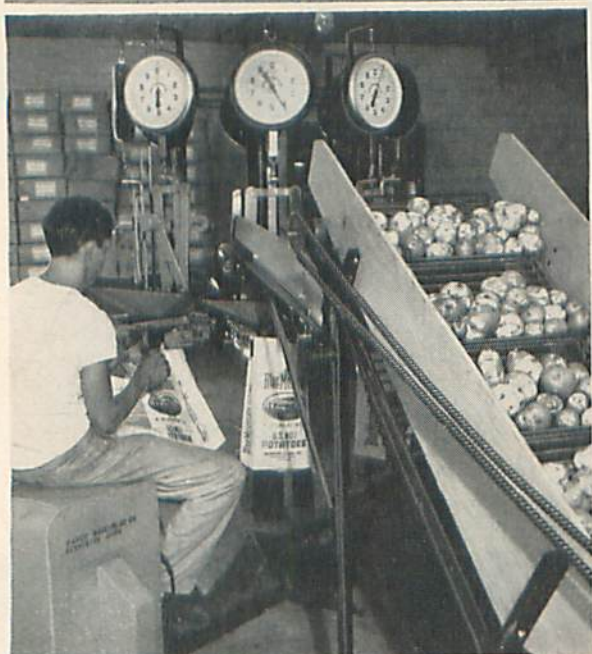




Loading elevator picks up potatoes from supply bin and dumps them into bagging units suspended from individual scales

Automatic Potato Bagger Weighs Each Sackful

Up to 1000 ten-pound bags of potatoes per hour are sacked and weighed by a new machine. A loading elevator takes the potatoes from a supply bin and dumps them into bagging units which are suspended from individual scales and rotate past the elevator on a circular track. The bags are held in place by rubber-faced shoes which are released by a cam mechanism, dropping the bags onto an outgoing conveyor belt. Operation is continuous and all moving parts can be synchronized by using a single control lever.



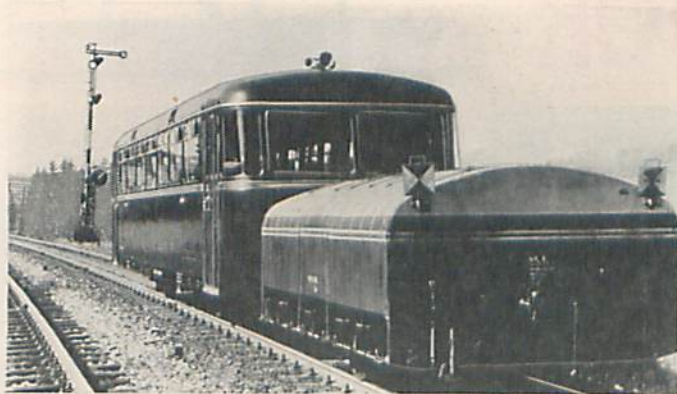
"Sky Cot" for Babies Clamps to Overhead Luggage Rack of Airplane

Babies flying on British Overseas Airways planes travel comfortably in a bunk designed especially for them. It is clipped onto the overhead luggage rack above the seats, and is said to be made so that the most restless baby cannot fall out. The bunk keeps a baby quieter, thus sparing the nerves of the mother and other passengers aboard the plane.



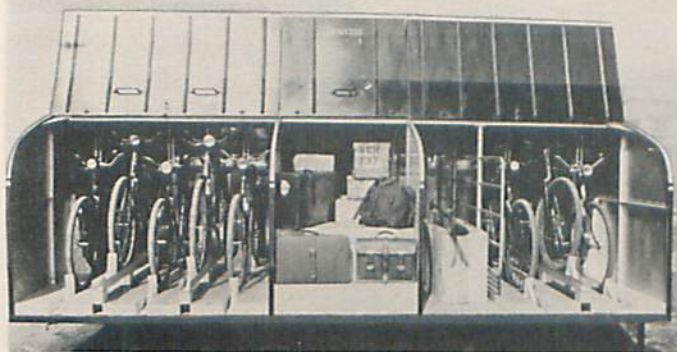
Miniature Truck Has Big Features

Five-year-old Jerry Bennett hauls his friends around in a miniature dump truck powered by a $4\frac{1}{2}$ -horsepower, air-cooled motor. The truck is complete with starter, generator, battery, dual wheels, automatic clutch and a dual-range transmission which has 10 forward and 7 reverse gears. It has sponge-rubber seats, sealed-beam headlights, taillights, a radio and goes 30 miles per hour. The truck, which is nine feet long and four feet wide, was built by Jerry's father, T. C. Bennett, at his shop near Troy, Mo. Bennett built the truck with about \$250 worth of materials and seven months of spare time. Jerry has driven miniature autos since he was three.



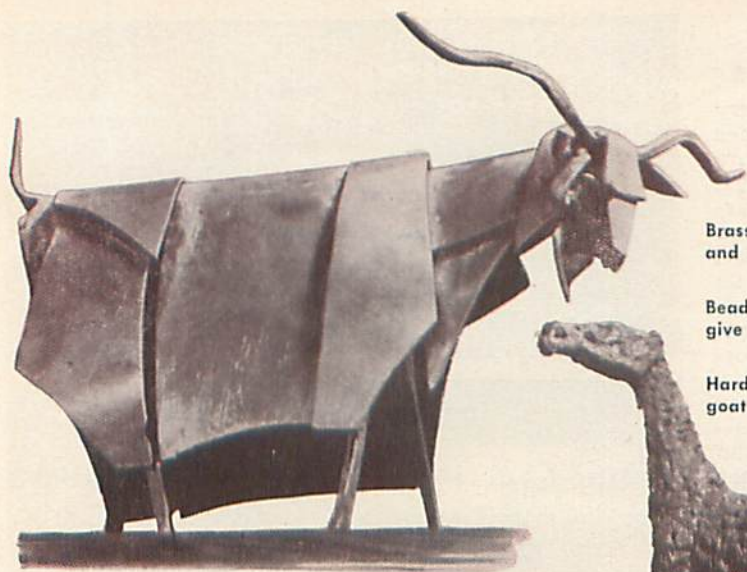
Train Hauls Bikes In Special Trailer

Passengers on the German Federal Railway can take their bicycles with them by storing them in special trailers behind the trains. About 250 railbuses—self-powered passenger cars—are fitted with the trailers. Each trailer has racks for mounting several bicycles and a compartment for the passengers' luggage. The railbuses, powered by two diesel engines, are used only on short runs.



Atomic Battery

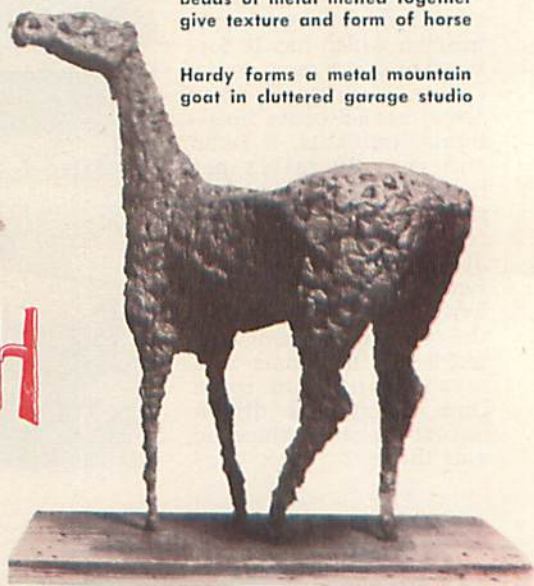
Heat from the atomic disintegration of radioactive polonium is the source of electric current developed in a small recently perfected battery. The heat supplied by the decaying atoms of the polonium activates thermocouples to generate electricity.



Brass goat has shaggy quality and stance of live counterpart

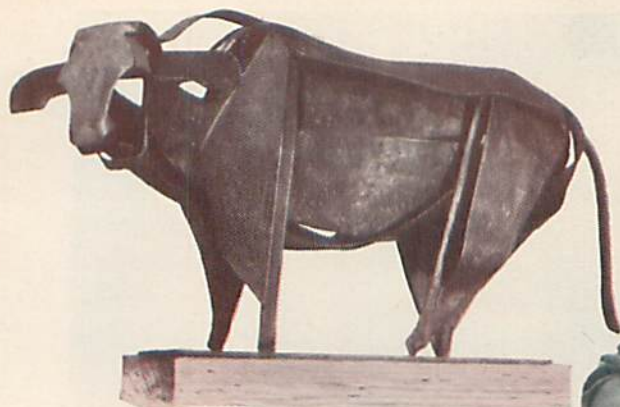
Beads of metal melted together give texture and form of horse

Hardy forms a metal mountain goat in cluttered garage studio



BLOWTORCH SCULPTOR





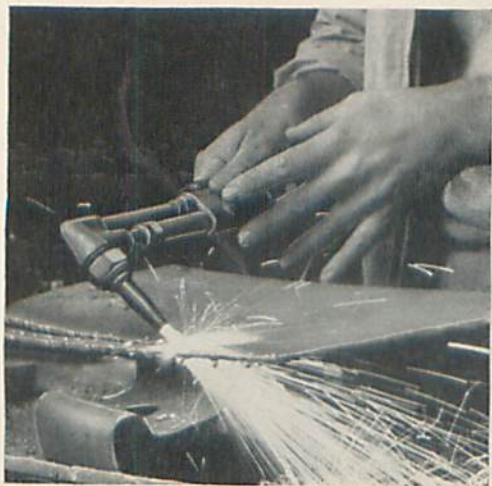
Bull made from copper sheets is strong and massive, yet cleanly graceful. Hardy is an experienced rancher

ARTIST TOM HARDY left his palette and smock in a closet four years ago when he turned his talents to sculpture in steel, copper and brass. Today, in a cluttered studio that looks like a blacksmith shop, he welds, bends, twists, hammers and chops metal into oddly graceful animals that are exhibited in leading museums.

Hardy finds models for his stylized animals in the livestock of his Oregon ranch and the wild inmates of western zoos.

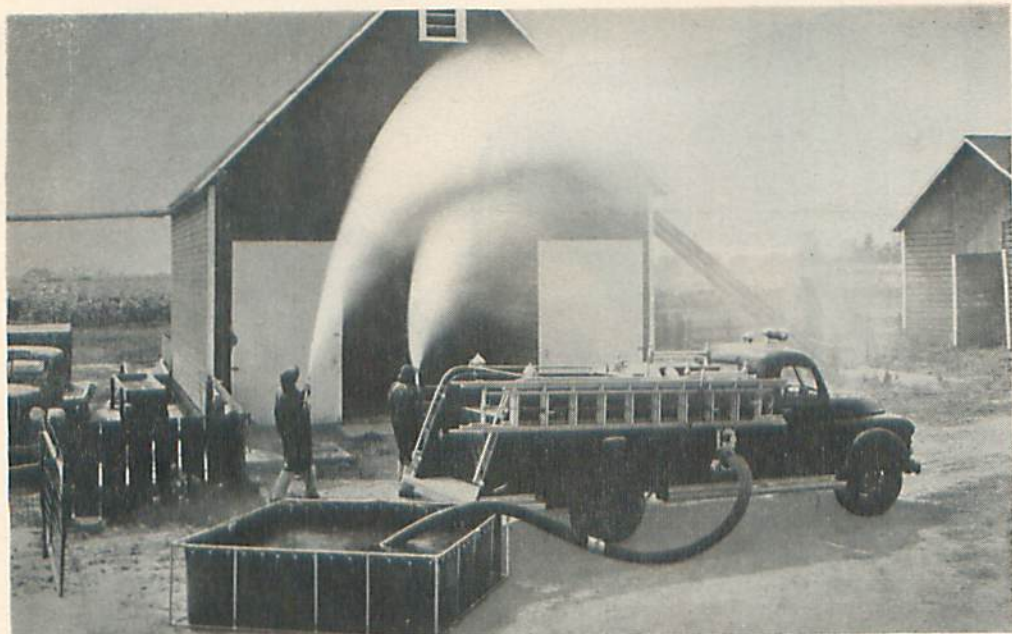
He usually starts with full-size paper patterns which he traces onto metal. Following the traced lines with an oxyacetylene torch, he cuts out the sections and welds them together, bending, twisting and modeling as he goes. Textures are hammered in, or chopped in with an ax. Surfaces are cleaned and sometimes polished, edges smoothed with a file or torch and the animal mounted on a base. ★ ★ ★

Cutting heavy-gauge steel is simple with the 3500-degree torch. Hardy handles the tool with expert ease



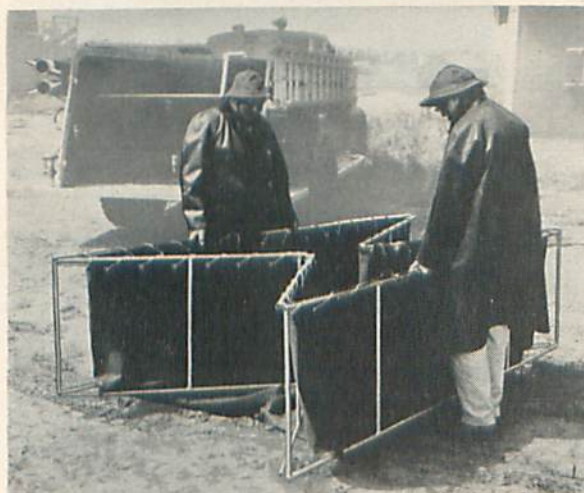
Hardy holds the welding rod in his teeth when it's necessary to keep one hand on the metal and the other on the torch. Below, the goggled sculptor takes rough edges off the nearly completed statue of a llama





Steel and Canvas Tank Holds Water for Firemen

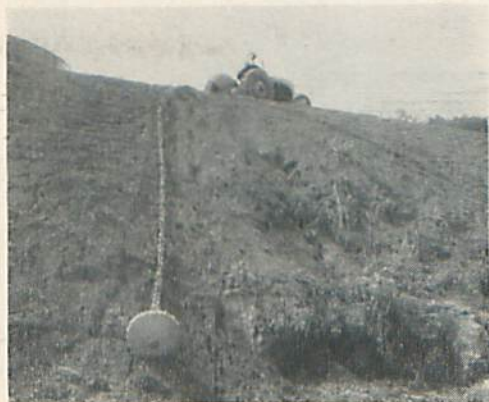
Weighing only 119 pounds and folding to a compact package, a newly developed portable 1000-gallon tank is designed primarily for use by rural fire departments. The tank is of waterproof duck, laced to a frame of steel tubing. Two men can set it up in less than a minute, and it can be filled with water rapidly to free the tank truck for water transport, while fire-fighting water is pumped from the canvas tank. A spillway which empties the tank in less than one minute aids portability and speeds removal after use.



Chain Studded With Picks Prepares Bank for Planting

Steep embankments are prepared for seeding by a weighted chain pulled by tractor or truck from the top of the slope. Revolving picks on the swiveling chain economically break up the soil. After two to four passes, gullies are filled, topsoil is spread more evenly and fertilizer is mixed with the dirt. The chain is anchored by a wheel that is weighted to keep it at right angles to the towing vehicle as it moves along the steep slopes.

☛ First television station in the Middle East is to be erected at Bagdad, Iraq.



School Cafeteria Tables Convert to Benches

Cafeteria tables that turn into benches allow school dining rooms to double as auditoriums. Each of the tables will seat three children on a side. When the top of the table is unlocked, it swings down so the table top becomes the back of a bench which seats five children. Thus the seating space is almost doubled without bringing in more chairs. Conversion is quick and simple.



Shark-Meat Food

Formerly considered worthless for food purposes, the flesh of sharks and rays has been turned into a high-protein, low-cost food product by scientists in India. The shark or ray meat is minced, washed, boiled in dilute acid, washed again and treated to remove fat before it is ready for human consumption. The finished product has an 85-percent-protein content, more than cheese or beef.



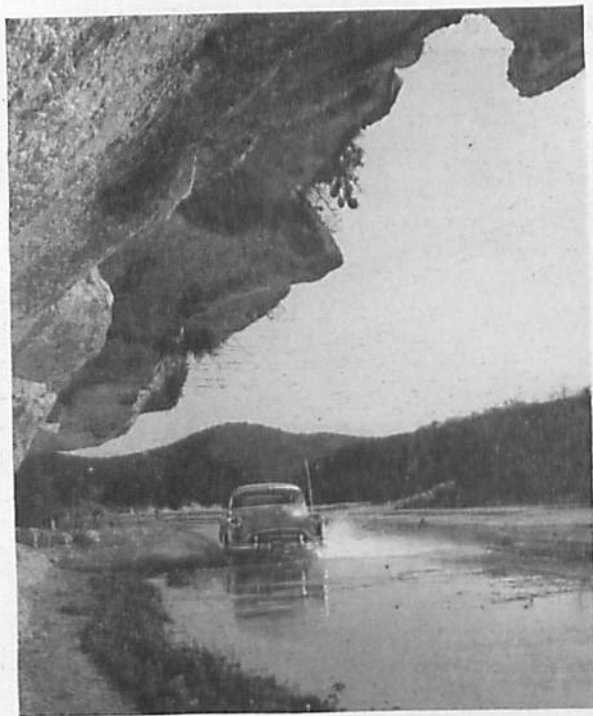
Attachment for Chain Saw Pins Limbs for Bucking



Small trees and limbs can be bucked right on the ground with a new attachment for a chain saw. The attachment has a spike that bites into the dirt, keeping the chain up out of the ground and pinning the logs to keep them from rolling away. With the attachment on the saw, the operator can reach out to saw limbs without stooping to go underneath them.

Test Tinted Windshields

Tests conducted by General Motors show that there is little difference in what a driver sees at night through tinted and nontinted windshields. Criticism has been made that tinted glass limits vision at night. More than 17,000 night experiments show that drivers see a mere nine feet farther through nontinted glass in a distance of 300 feet.



Car kicks up a spray as it traverses section of river road



Sign warns motorists to keep on safe side of river. Irregular holes and crevices are mostly along the right bank. Below, rancher Earl Prade, Jr., prepares to extricate car that has dropped in a hole. He must do this about three times a week during the summer



Where

ONLY IN TEXAS, near the town of Leakey, can you find a highway in which you can fish, swim, wash your car and fill your drinking cup. This is the famous Frio Canyon River Road, a section of State Highway 336 that runs for 5.6 miles on the property of the 10,000-acre Prade Ranch. Crystal-clear water two to six inches deep covers the limestone river bed, which is marked by ruts made when pioneer wagon trains used it as a main artery. Holes and crevices in the rock offer a hazard to motorists, but these are mostly along one side. Signs, posts and rocks marked with orange disks serve as traffic guides. There are plenty of blue-channel catfish, bream and large-mouth bass in the river. People frequently fish right out of their cars. Tourists like to bathe in the clear, sweet water and often wash their cars at the same time. Springs bubbling out of canyon walls provide water for the thirsty. And the route is safe—you can't work up much speed for an accident while churning through water! ★ ★ ★

Cars Leave a Wake



Cedar posts anchored firmly in bed of river serve as "channel markers" for motorists. Other traffic guides are orange disks painted on river rocks

Deep ruts cut by pioneer wagons in the limestone bed of the river are still visible. Route was once an important artery. Water is up to six inches deep

Entrance to the underwater highway is from the north, on the property of the Prade ranch. County highway department plans a new route to bypass road

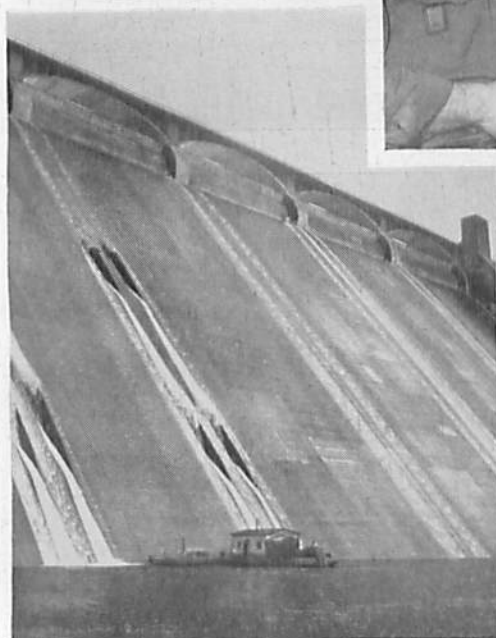




Diver holds five-foot bar with the TV camera in center and photoflood lamp on either end. Shooting took place 70 feet below level of river

Gloved hand of diver working at base of dam shows on TV screen. Picture was far from clear, but experiment demonstrated value of underwater TV

Viewers of demonstration watched the "program" from barge anchored at base of dam. Coaxial cable connected the underwater camera to set

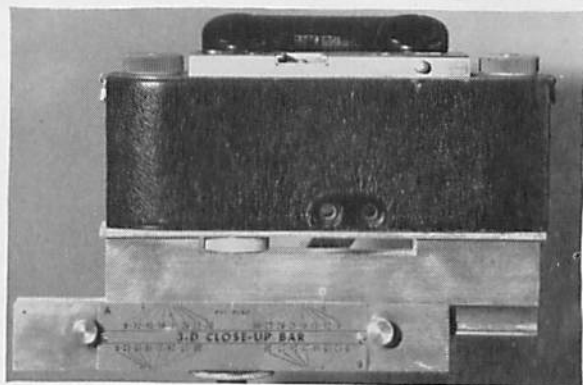
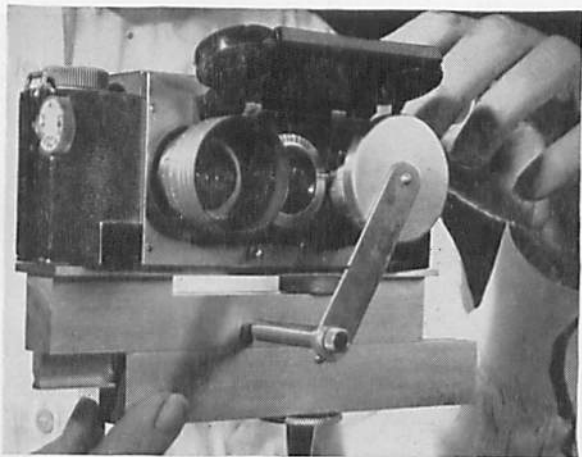


Television Goes Underwater

FEDERAL ENGINEERS recently gathered to watch a TV program featuring views of Grand Coulee Dam from 70 feet underwater. The men, standing on a barge anchored near the dam, watched a 14-inch screen as divers trained a TV camera and floodlamps on concrete damaged by plunging water. A coaxial cable led from the barge to the divers far below. The camera, enclosed in a watertight, cast-aluminum housing, was prefocused at three feet. It was mounted in the middle of a metal bar which contained a floodlamp on either end. As a diver moved camera and lights about, TV for the first time enabled dry observers to inspect concrete curvature of the base.

Special Stereo Mount Makes Close-Ups Easy

Close-up stereo photography requires careful lateral movement of lenses to achieve the exact angle difference between the two exposures to produce both depth and clarity in the viewer. Normally this requires complicated-formula application on the part of the photographer, but an Iowa manufacturer has produced a sliding-bar camera mount that makes calculations mechanically. Mounted and centered on the bar, the camera is shifted from one correct position to the other by a simple sliding action. A capping hood covers the lens not in use.



Air May Lubricate Jets

Because petroleum oils break down at high temperatures, turbo-jet airplanes, which generate up to 1000 degrees Fahrenheit in bearing casings, may be lubricated by air. These air bearings use high pressures to suspend the moving parts in air. Such bearings can withstand terrific loads at very high temperatures and are not subject to fatigue failure or thermal instability.

Tape Recorder Becomes Chef in Automatic Bakery

When you dine out in the future, electronic chefs may cook your meals. A new machine, designed to demonstrate automation, turns out cakes, pancakes and other delicacies without any help from a human

chef. The heart of the machine is an ordinary magnetic tape recorder. To set up the operation, the tape is played while an operator seated at a control board moves dials in the proper sequence in order to feed in the right amounts of flour, eggs, baking powder and other ingredients. Then whenever the tape is played back, it activates various relays and the ingredients automatically are measured into a mixing bowl and the mixer turned on. The manufacturer points out that the number of cakes that can be turned out simultaneously is limited only by the mixers and accessory equipment, since the tape will direct as many machines as desired. The recorder also can be used to direct many common industrial operations.





Twin Pioneer, under construction above, developed from single-engine liaison aircraft, right

Low Landing Speed For Twin Engines

Designed to maintain flight at speeds as low as 48 miles per hour, the Twin Pioneer, made by a Scottish firm, is a development of a highly successful single-engine, liaison-type plane, the Prestwick Pioneer, which has proved itself on tiny air strips in Malaya. The Twin Pioneer is designed as a 16-passenger aircraft with a top speed of 180 miles per hour and ability to get in and out of fields as short as 200 yards



with a full safety margin. Builders of the Twin Pioneer hope that it will take over much of the work now done by the larger helicopters.

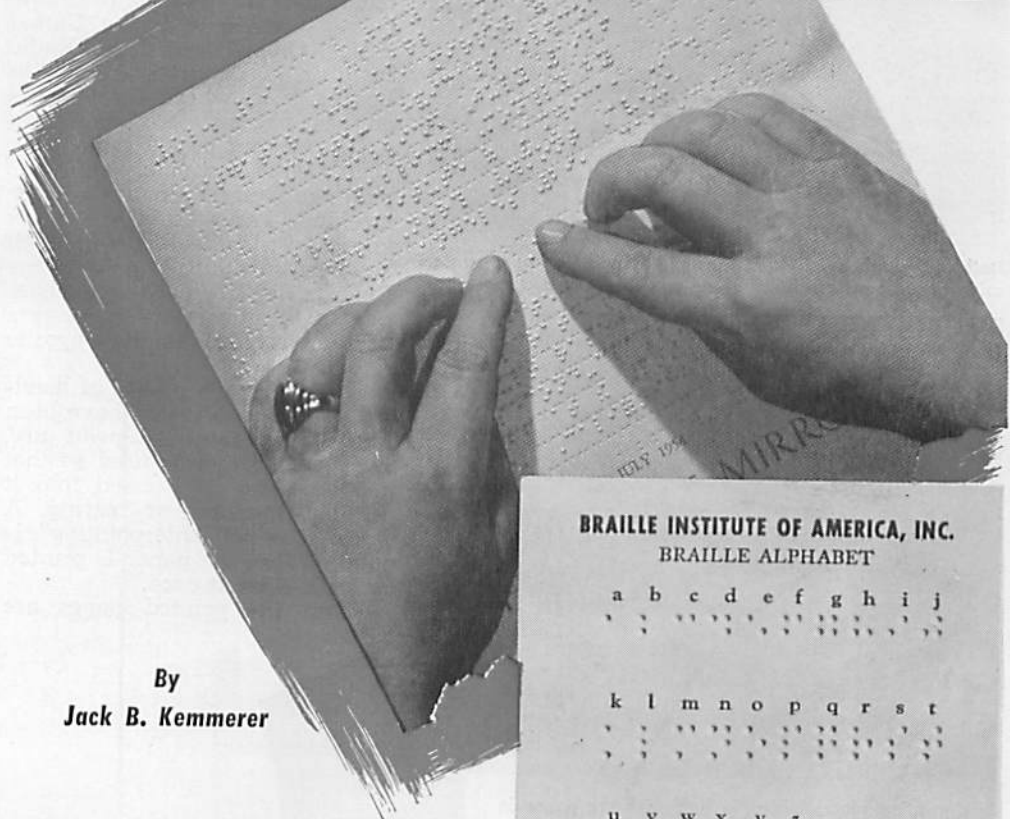


Dredging Rake Finds Ammunition

Lost ammunition is dredged from the bottom of West Berlin's Havel River with an oversized rake developed by German engineers. Experts estimate that there are still several thousand tons of artillery shells and other explosives under water, a danger to the swimmers.

❏ In 1954 scheduled transport aircraft flew an estimated 1,200,000,000 miles as compared to 190,000,000 miles in 1939.

HOW THEY PRINT FOR THE BLIND



By
Jack B. Kemmerer

WHEN A FRENCH ARMY CAPTAIN, Charles Barbier, developed a system of "night writing" so that his soldiers could read messages in the dark, he little realized that his invention would liberate generations of sightless persons. His alphabet of raised dots on paper was adapted by Louis Braille in 1829 into a six-dot code now known as the Braille system. Today, blind people all over the world use Braille to read in their native languages. The sightless in the United States are served by a network of 26 free libraries that circulate Braille books and magazines.

The books are cumbersome. When Webster's Student Dictionary was printed in Braille, 33 volumes were necessary to contain the material of the original one volume.

Much more printing space is needed because each character must be represented by an adaptation of the Braille "cell"—three pairs of two dots each arranged

BRAILLE INSTITUTE OF AMERICA, INC. BRAILLE ALPHABET

a b c d e f g h i j
⠁ ⠃ ⠉ ⠇ ⠋ ⠍ ⠏ ⠒ ⠖ ⠘

k l m n o p q r s t
⠅ ⠉ ⠋ ⠍ ⠏ ⠒ ⠖ ⠘ ⠜ ⠞

u v w x y z Capital Sign (dot 6)
⠠ ⠡ ⠣ ⠤ ⠥ ⠦ ⠧ ⠨ ⠩ ⠪ ⠬ ⠭ ⠮ ⠯ ⠰ ⠱ ⠲ ⠳ ⠴ ⠵ ⠶ ⠷ ⠸ ⠹ ⠺ ⠻ ⠼ ⠽ ⠾ ⠿

NUMBERS
Number Sign 1 2 3 4 5 6 7 8 9 0
⠠ ⠠ ⠠ ⠠ ⠠ ⠠ ⠠ ⠠ ⠠ ⠠

PUNCTUATION
⠂ ⠄ ⠆ ⠈ ⠊ ⠌ ⠎ ⠐ ⠒ ⠔ ⠖ ⠘ ⠚ ⠜ ⠞ ⠠ ⠡ ⠣ ⠤ ⠥ ⠦ ⠧ ⠨ ⠩ ⠪ ⠬ ⠭ ⠮ ⠯ ⠰ ⠱ ⠲ ⠳ ⠴ ⠵ ⠶ ⠷ ⠸ ⠹ ⠺ ⠻ ⠼ ⠽ ⠾ ⠿

The six dots of the Braille cell are arranged and numbered thus:

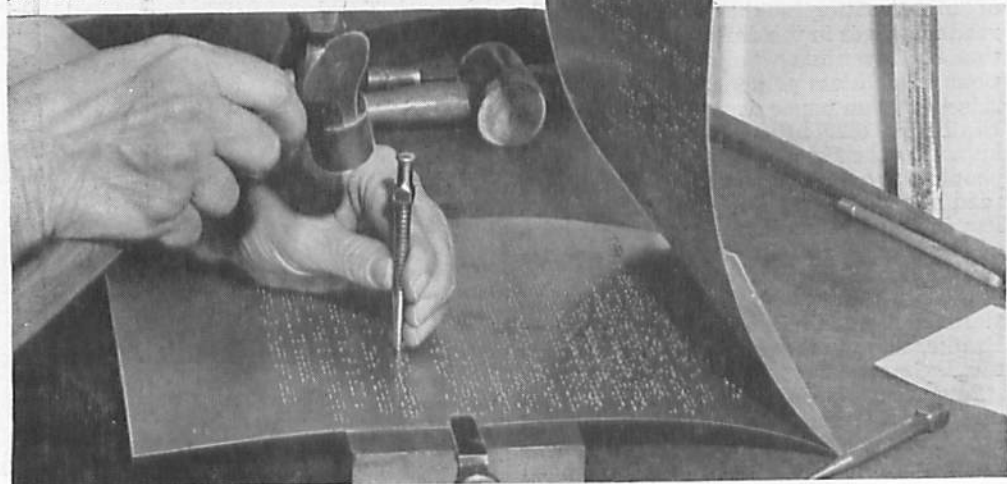
With them a total of 258 distinct characters and word signs are possible. These six dots in the Braille system are adaptable to and, therefore, used in any language having an alphabet. From them are formed complete literary, mathematical, chemical and musical codes. Braille is printed in Grades 1, 1½ and 2, depending upon the degree of contraction.



Dots are punched into thin zinc plate by stereotype operator using a keyboard consisting of six punch keys and a space bar



Zinc printing plate, folded in half with the paper in the middle, is placed in proof press. Both sides of sheet are printed at same time. Below, mistakes in plate are flattened. Corrections are made by machine



vertically. This variation gives a touch alphabet of 63 characters. When a system of contractions is used, 258 distinct characters and word signs are possible.

The printing of Braille literature is slow, expensive and requires special paper and equipment. There are four major Braille printing concerns in the United States. One of these is the Braille Institute of America, located in Los Angeles, where the pictures on these pages were taken.

The making of a Braille book begins when extremely thin zinc plates are placed in a stereotype machine. The stereotype has six keys and a space bar, with each key corresponding to a dot of the Braille cell. The machine punches dots in the thin plate to create a printing surface on the opposite side.

The plates are placed in hand-fed platen presses that have been converted from ink-print use. Dampened paper is used so that the dots can be pressed into it without breaking or tearing. A process called "interpointing" is used so that the paper is printed on both sides at once.

After the printed pages are



Book pages are printed on converted hand-fed platen presses. Paper is moist to prevent breaks and tears

taken from the press, they must be dried before being bound. The dried sheets are assembled by hand and then stitched in the conventional manner. In binding, spacer strips are inserted every eight pages to allow for the thickness of the embossed paper. Otherwise, the bound books would not lie flat.

Magazines are printed in a similar but speedier process. Because the circulation is large and the time element important, self-feeding rotary presses converted from ink-print use are utilized. Zinc plates



After the pages have dried, they are assembled, put through a conventional stitching machine and bound

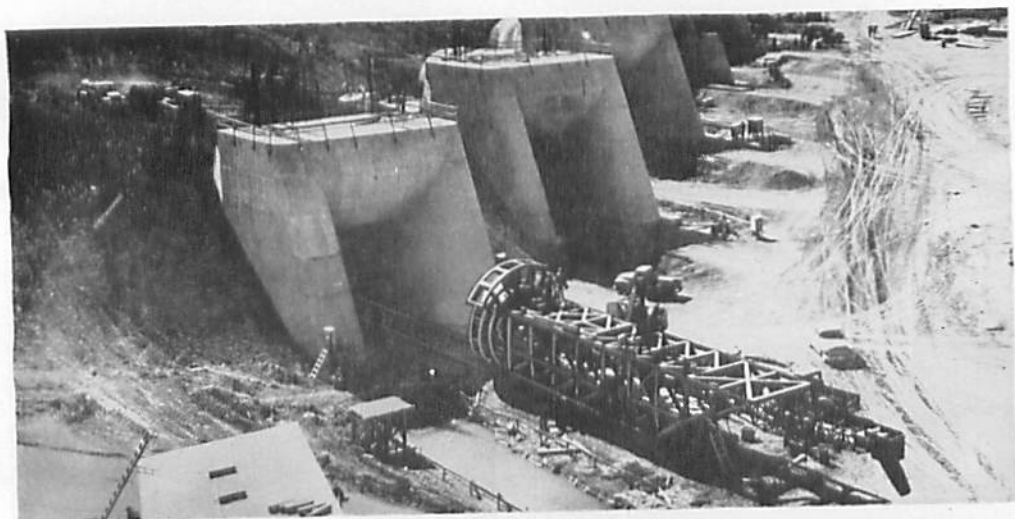
curved to fit the printing cylinders punch dots into dry paper as it speeds through the press. Some of these presses can print 400 pages per minute.

The finished product—book or magazine—enables the blind person literally to “keep in touch” with the world about him. Using his right index finger as a “leader” and his left as a “verifier,” the master of Braille scans the embossed page with ease and speed that nearly equal, and sometimes may even surpass, that of the conventional reader.

★ ★ ★

Average Braille volume contains 34,000 words on 180 pages. These 21 volumes make up one Braille Bible

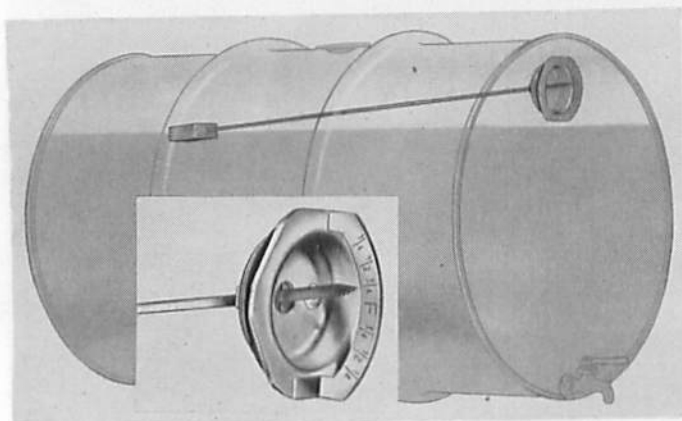




Machine moves on rails, digging tunnel 20 feet wide at six to eight feet per hour. Six 3500-foot tunnels are to be bored out

Tunnel-Mining Machine Digs at Rapid Rate

Designers of a 100-ton tunneling machine in use at the Oahe Dam site near Pierre, S. D., expect it to simplify one of the most costly and dangerous phases of construction. The machine represents the first reported attempt to apply "continuous mining" methods to a large-scale tunneling operation. The continuous-mining machine is expected to progress from six to eight feet per hour, instead of the one to two feet per hour present rate. It is being used to mine six flood-control tunnels, each 20 feet wide and 3500 feet long. The Oahe Dam is part of a Missouri River flood-control program.



Gauge Tells Level

Oil drums used to dispense liquids are quickly fitted with a simple gauge that indicates fluid level. The bung is replaced with a screw-in cap marked to indicate various levels. A rod attached to a foam-plastic float inside the barrel projects from the cap and acts as a pointer. As the fluid level in the barrel goes down, the float-rod pointer moves up.

Electric Dolly Jockeys Plane

Driven by a battery-powered electric motor, a power dolly has been built to assist in movement of light aircraft on the ground and in the hangar. The dolly, or transporter, is maneuvered by hand until it is under the nose wheel, or tail wheel or skid. The wheel or skid is then locked into position, and the dolly motor moves the aircraft.



German Beach Chair Serves as Cot or Contour Chair

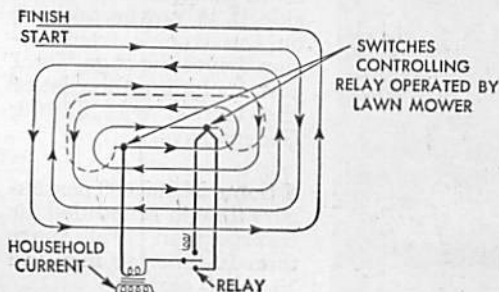


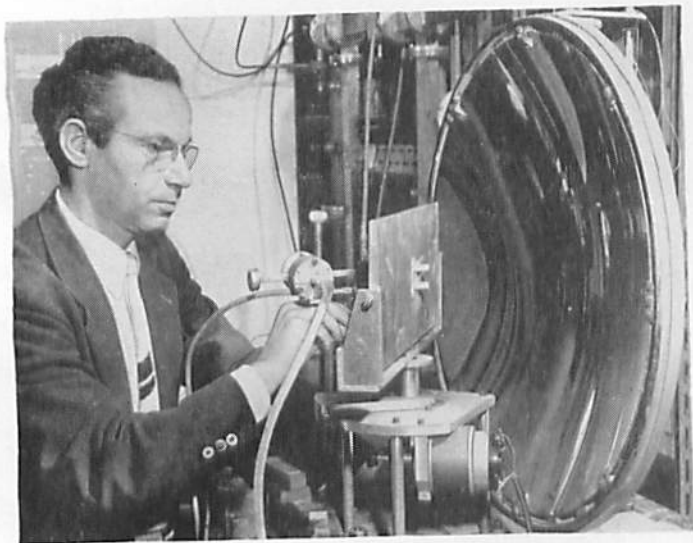
German ingenuity has developed a new metal-tube-and-canvas chair that can be made into almost anything you want. It can be adjusted as a contour chair, a plain canvas cot or a deck chair, complete with sunshade. A simple friction clutch holds it in any desired position, and the chair can be folded into a small package to carry home.

Self-Guided Mower Follows Electrical Cord Laid in Lawn

Electrical cord laid in the lawn guides an automatic lawn mower built by William Brobeck of Orinda, Calif. Separate motors supplied by another cord attached to a reel on the mower drive the two wheels. Each motor is connected to a coil that picks up the induced current from the electric cord. The coils, wound in opposite directions, cancel each other out if the mower exactly straddles the electric cord. If the

mower goes off to one side, one of the motors is checked long enough to bring the machine back into line. The mower, which will cut an entire lawn without attention, cuts alternate swaths as it moves in toward the center of the lawn and mows the remaining portions on its return trip. Additional coils, an audio amplifier, a transformer, sensitive switches and relays are used in the system.



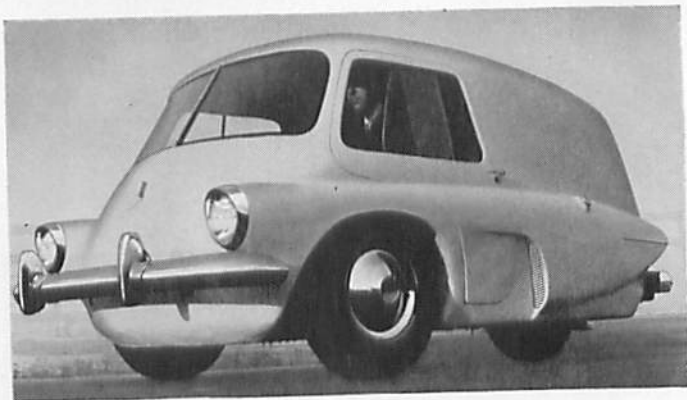


Generated Waves Fill Research Gap

Millimeter waves about $\frac{1}{1000}$ inch long have been generated on a millimeter-wave generator at Stanford University. The waves fill a gap in the electromagnetic spectrum between the microwaves that carry television programs and the extremely short waves of infrared radiation. Light waves are shorter still, and have been generated experimentally on the Stanford machine, invented by Dr. Hans Motz who suggests their use in radio.

Three-Wheel Car

European in appearance is the "Stationette," a three-wheel, rear-engine, light delivery car made in America. A two-seater, it has plenty of cargo room. The low-priced car has no chassis. Instead, reinforcing is molded into the plastic body. A 24-horsepower, four-cylinder engine gives a cruising speed of 45 miles per hour.



Huge "Squirrel Cage" on Truck Removes Bark From 65 Posts at a Time



Revolving like a squirrel cage, a truck-mounted post peeler removes the bark from 65 posts in nine minutes. Built by Bob George of Leslie, Ark., the machine prepares pine posts for creosote baths. A series of knives inside the steel cage cuts the bark off as the poles tumble inside it. A power take-off on the truck's transmission drives the cage. Total cost, including the cost of the truck, was \$2800, George says.

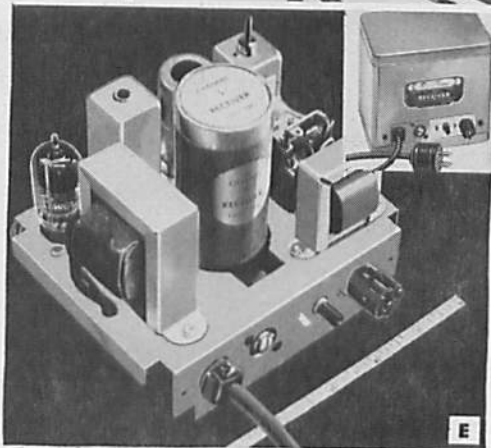
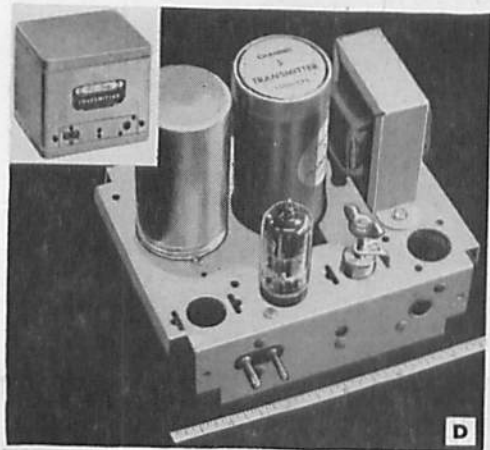
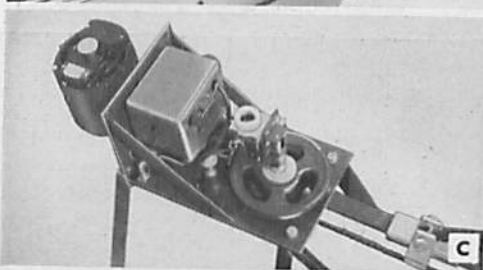
Some 54,000,000 passengers flew in scheduled air transport in 1954, more than 10 times as many as 15 years earlier.

Radio Television Electronics

Radio-Controlled Garage-Door Opener

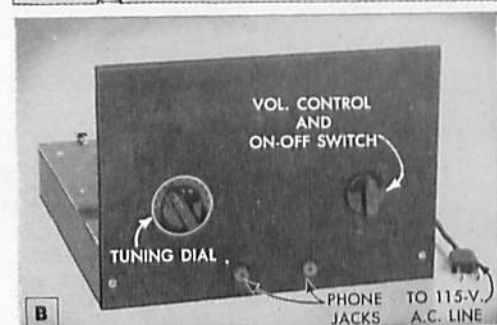
REMOTE CONTROL for your garage door by means of a radio signal from a transmitter in your automobile is now available to car owners in a complete easy-to-assemble system for about \$146. Early methods using manual key-posts, buried-coil magnetic systems and photoelectric devices could not gain wide popularity because they lacked flexibility. Such systems required stopping at designated spots, lacked exclusive control by the owner and required an elaborate installation technique. None offered the fine performance of radio control as it permits the driver to remain in the car while the door is opened and the light turned on by merely pushing a button as illustrated in photo A. The Federal Communications Commission has designated the Citizens frequency of 27.255 mc. for remote-control purposes. This system uses a one-tube transmitter, crystal-controlled at 27.255 mc., which is installed under the hood of the car. The antenna is hidden behind the front bumper.

The complete system consists of the door mechanism and motor with plug-in receiver for 110-120-v., 50-60-cycle a.c. as illustrated in photos B, C and E, the transmitter for six-volt automobile-battery operation shown in photo D and all hardware, tubes, wire, installation and operating instructions. The receiver plugs into the door opening mechanism, photo C. It is claimed the operating range of the transmitter, depending on location, is from 100 to 300 feet.



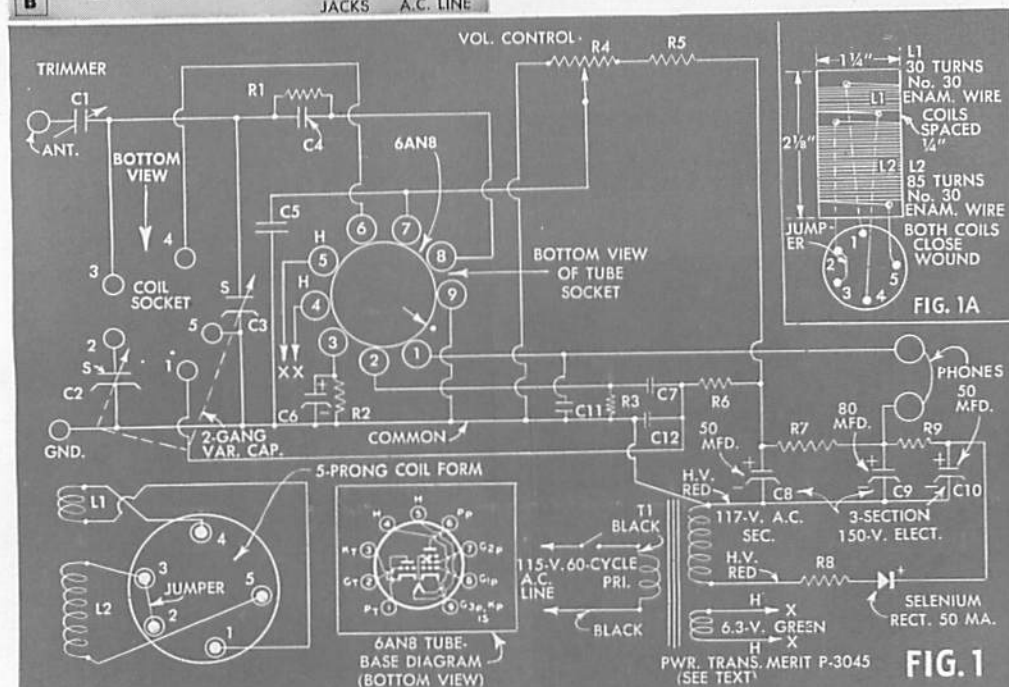
NEW STUDENT SET FEATURES TV-

By Jay Stanley



BEGINNERS, here is the latest in the popular "student series" of progressive sets so designed that the builder can start out with an easy-to-build complete one-tube set—then without wasting a part, progress to a more complicated set which will be described in a later issue. The second set will operate a loudspeaker with ease and also include plug-in coils for short-wave bands. A few additional parts will be required for the second set; both are complete receivers.

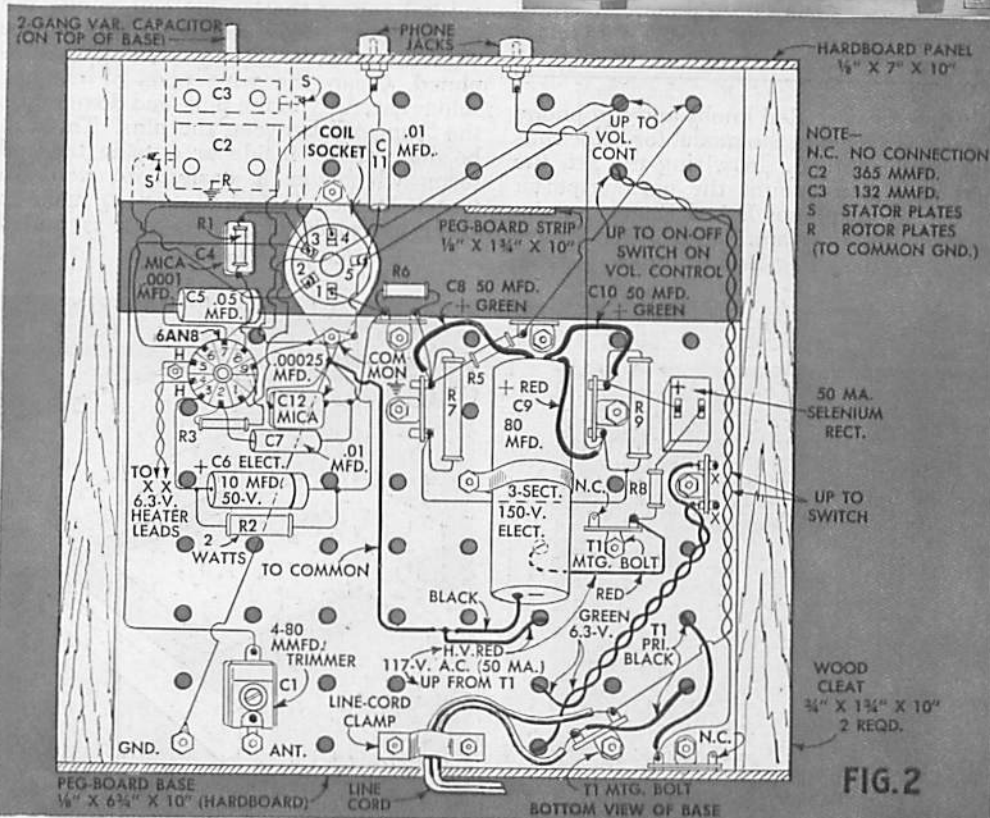
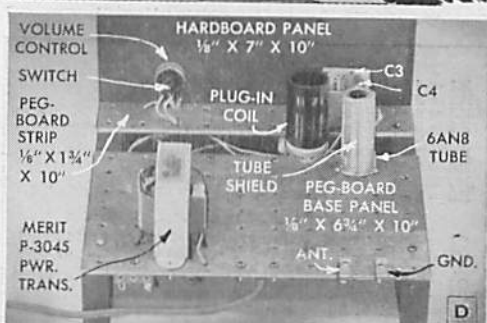
This first set is built around a new tube designed originally for television sets. Actually two tubes in one, a pentode and a triode, it is ideal for use in a simple receiver. Such a high-gain set will generate about all the volume you could want for headphone reception. In this set, which is for the broadcast band only, the tube is used as a regenerative detector and a resistance-coupled audio stage. Power for the set comes from a TV booster-type power transformer and a selenium rectifier. Since the latter replaces the usual rectifier tube, the simple one-tube set is actually a three-tube set in performance. The use of the power transformer isolates the power line from the actual circuitry of the receiver, thus making it safer to work on

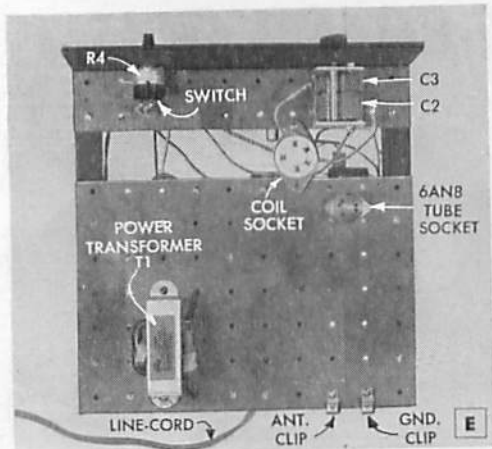


TYPE TUBE and 'PEG-BOARD' CHASSIS

than the all-too-common a.c.-d.c. sets for beginners.

To make construction easy for the builder with limited tools, the set is built on a "Peg-Board" hardboard chassis which virtually eliminates hole drilling, since there are regularly spaced holes available for mounting parts; see photo A and Fig. 3. This set uses one plug-in coil, Fig. 1A; thanks to a simple arrangement of connections to the coil pins, both sections of the tuning capacitor (C2 and C3) are used to cover the broadcast band—but only one section will be used later for easier tuning on the short-wave bands. The "switching" will be accomplished automatically simply by plugging in the proper coil. The rotor plates of the 2-gang capacitor are common with the frame; run a ground lead from the frame to one of the common-ground soldering lugs. The two "Peg-Board" chassis strips are mounted on two small wood cleats which are painted black. The cleats also serve to support the front panel, which has a black crackle finish. The panel is drilled for the various parts it supports before it is mounted on the cleats by means





RESISTORS

R1 = 470,000-ohms, $\frac{1}{2}$ -watt carbon
 R2 = 2700-ohms, 2-watt carbon
 R3 = 470,000-ohms, $\frac{1}{2}$ -watt carbon
 R4 = 0-25,000-ohm vol. control with switch
 (Mallory U29 midset linear taper)
 R5 = 100,000-ohms, $\frac{1}{2}$ -watt carbon
 R6 = 270,000-ohms, $\frac{1}{2}$ -watt carbon
 R7 & R9 = 1000-ohms, 1-watt carbon
 R8 = 22-ohms, 1-watt carbon

CAPACITORS

C1 = 40-80 mmfd. trimmer (mica-type ceramic base)
 C2 & C3 = 2-section superhet.-type tuning capacitor. C2 = 365 mmfd.; C3 = 132 mmfd.
 C4 = .0001 mfd. mica fixed capacitor
 C5 = .05 mfd. 400-V. tubular paper type
 C6 = 10 mfd. 50-V. electrolytic
 C7 = .01 mfd. 600-V. tubular paper
 C8, C9 & C10 = 3-section elect. 150-V.
 C8 = 50-mfd.; C9 = 80 mfd.; C10 = 50 mfd.
 C11 = .01 mfd. 600-V. tubular paper
 C12 = .00025 mfd. mica type

of wood screws. Red knobs and red phone jacks were used in the model for color contrast, see photo B. In wiring the set, the first step is to mount the various parts; follow layout photos D and E and the pictorial wiring diagram, Fig. 2, which is easy to do as the "Peg-Board" holes provide

"positioning." Notice that the large coil socket is mounted between the chassis strips; the smaller opening (hole) for mounting the miniature tube socket must be cut in the "Peg-Board" material; this is easily done with a hand drill and reamer.

Only four parts are mounted on the front panel: the tuning capacitor, volume (regeneration) control and the two phone-tip jacks. The volume control should have the switch (single-pole single-throw) attached before it is put into place. Check your wiring with both the pictorial diagram, Fig. 3, and the schematic circuit diagram, Fig. 2, as you wire the set. Be sure to watch the color code of the leads on the power transformer—a mistake at that point can burn out either the transformer or the tube. Color-code data come with the transformer. Do not try to wire from any photo. Another easy place to make a mistake is at the 6AN8-tube socket terminals. Make sure that you are soldering to the right lug, and be careful that no solder flows down between the lugs and shorts them together. A small pencil-type soldering iron is large enough for all of the wiring.

Winding the coil, Fig. 1A, takes a little care. Drill small holes for the start and finish of each coil. Beginning with the ground end of the largest coil, rotate the coil form with one hand and guide the wire with the other until the winding is completed. Clean the wire ends of enamel, solder carefully to the pins, and do not miss the "jumper" between the pins. This can be done either inside or outside the coil form, whichever is easiest for you. To insert jumper inside the form, make a U-shaped piece of wire which is pulled

(Continued to page 266)

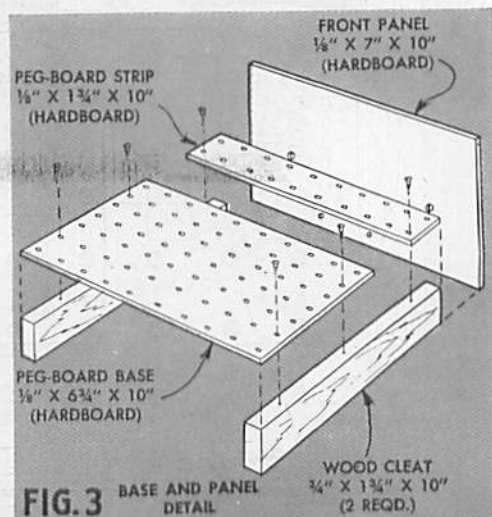
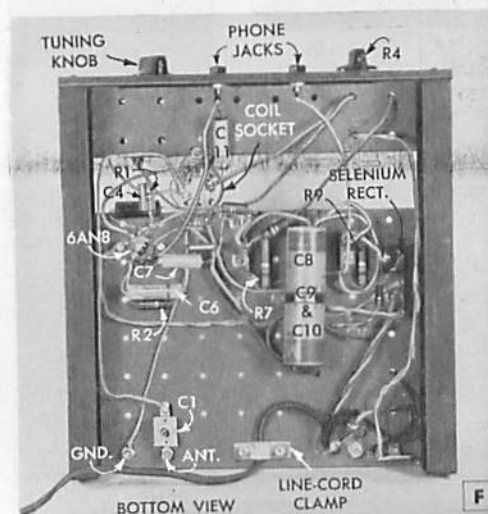


FIG. 3

BASE AND PANEL
DETAIL

POPULAR MECHANICS

the

POPULAR
MECHANICS

CRAFTSMAN

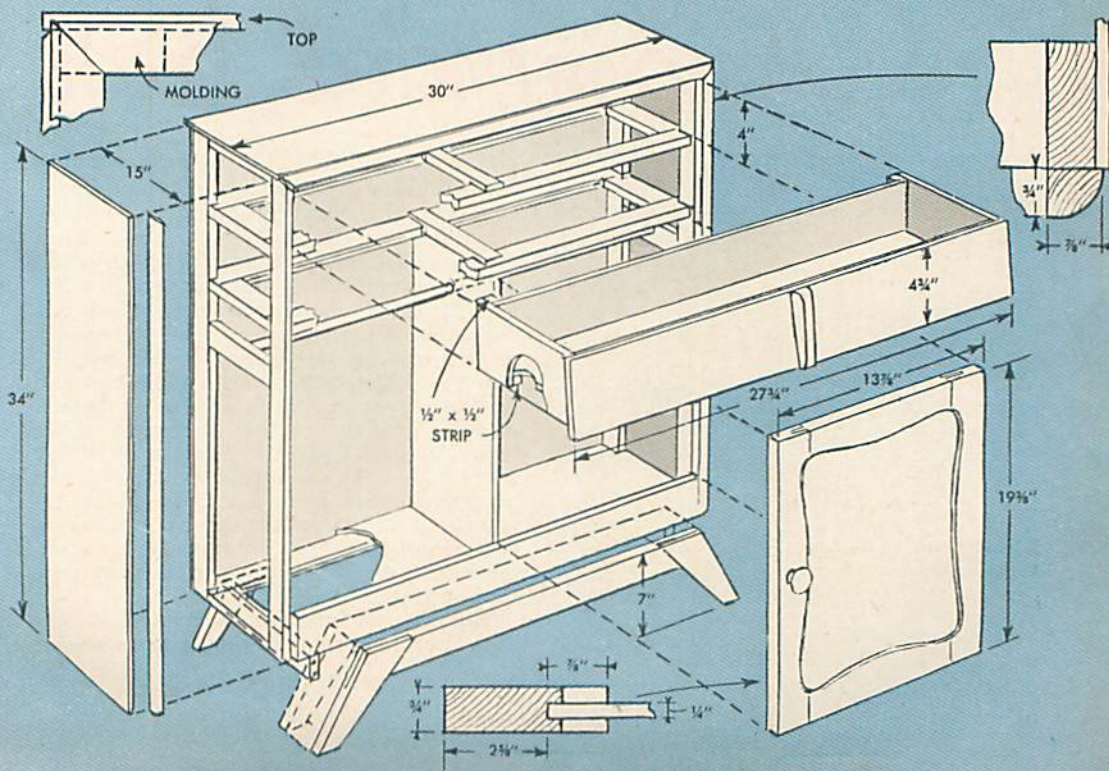
By John Bergen

THE NUMBER-TWO BOSS of your family will become mighty excited over this handsome little chest when she hears that you plan to build it for her very own. For now she can keep her party-best neatly stored just like big folks.

General construction is given in the pull-apart drawings shown below but, if you wish, you can work from a full-size plan and material list which are available. Except for the inner framework, legs and door-frames, which can be of white pine, the greater part of the chest is made of $\frac{1}{4}$ -in. hardboard—this even includes construction of the two drawers.



JUVENILE CHEST





Two ornamental-iron columns and matching brackets supporting glass-fiber roof transform commonplace stoop (below) into an attractive sheltered entrance. Iron is finished with a special weather-resistant paint

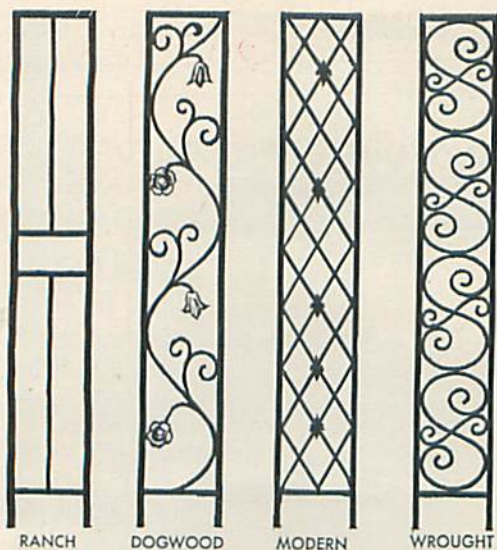
DRESS UP YOUR HOME WITH

Ornamental Iron



CUSTOM-FABRICATED to harmonize with the architecture of your home, even though it might be just plain everyday American, decorative ornamental ironwork now can be purchased in kit form and put together with a screwdriver. It's the latest trend in home improvement and one that appeals particularly to the do-it-yourself homeowner due to the ease of installation and the resulting charm, character and feeling of permanence it adds to any home. A good example of this is shown in the before and after photos on this page, which show how a typical unsheltered stoop can be transformed from a commonplace entrance to an attractive open porch, using two ornamental-iron columns and matching brackets to support an awning-type roof of glass fiber.

Tailoring ornamental ironwork to suit each individual installation is a service of

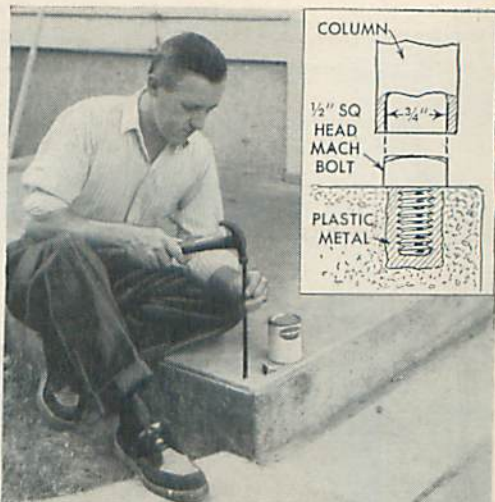


1 CHOICE OF AVAILABLE IRON COLUMNS

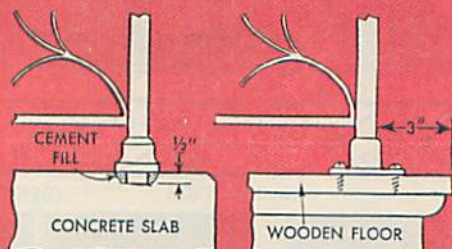
the Tennessee Fabricating Co. who makes a careful study of an actual photo of your house to determine what grillwork will look best and be appropriate with its particular architecture. Then the complete installation is custom-fabricated at the factory and shipped knocked down, ready to erect and paint. A special weather-resistant, plastic-type paint is used for painting ornamental iron which is flowed on with a soft brush directly from the can.

Ornamental-iron columns are but one of the many items of custom-fitted grillwork that the homeowner may order by mail to dress up both home and lawn. Porch and terrace step railing, and cornice grillwork are available in several attractive designs. All can be obtained fabricated in wrought iron or in a combination of wrought iron and cast iron. Some of the column designs available are pictured in

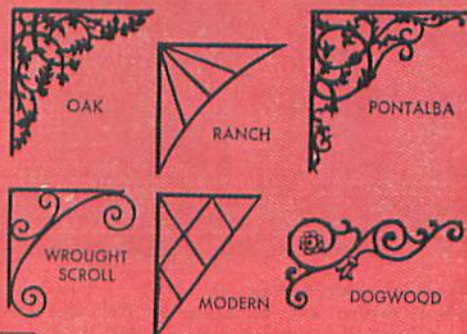
Below left, columns are plumbed both directions before fastening to cornice at top. Below center, roof structure consists of simple U-shaped cornice, mitered at corners. Below right, matching brackets are bolted to columns and fastened to cornice with screws



Holes for bolt-head studs over which legs of columns fit, are made with star drill. Cement anchors bolts

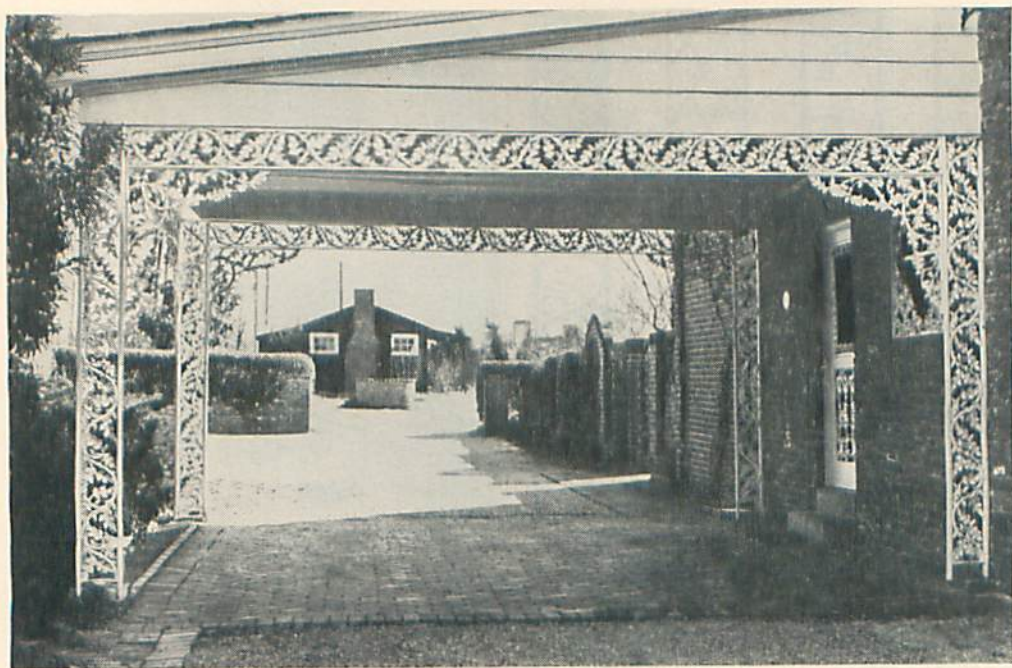


2 HOW COLUMNS ARE INSTALLED



3 CHOICE OF AVAILABLE BRACKETS





WROUGHT SCROLL



DOGWOOD

CORNICE PATTERNS

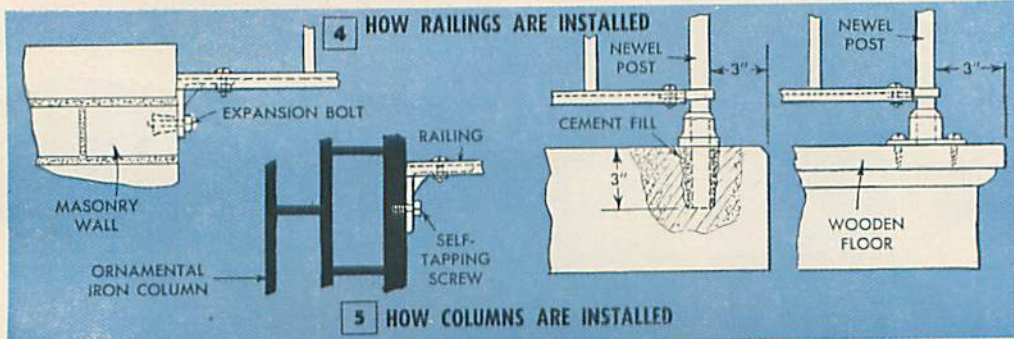


Attractive oak-leaf stair and porch railing adds both protection and distinction to this uncovered stoop. White ironwork contrasts with dark brick walls

Above, cornice grillwork may be used in addition to columns and brackets as shown in carport photo. Two of cornice patterns available are shown in drawing

Fig. 1 and at the top of the facing page, with matching brackets being shown in Fig. 3. Cast-iron-type columns consist of steel uprights of box channel which are tack-welded to fancy hand-carved sections faithfully reproduced in cast iron. Columns are manufactured in both flat and right-angle sections, come complete with screws and are sandblasted and prime-finished at the factory.

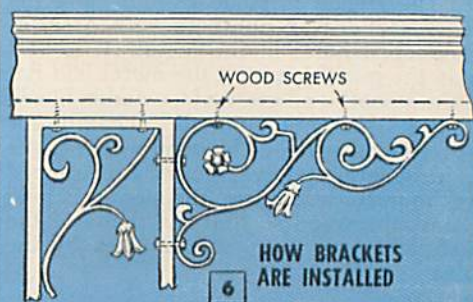
Whether these graceful iron columns are used to dress up the front of a porch or support the roof of a carport as shown in





How ordinary this porch would look with conventional wooden posts, but see what a charming effect these lacy iron columns add to this veranda-type open porch

the typical examples at the top of these pages, installation is easy and comparatively inexpensive. Perhaps the most difficult part of the installation is chiseling holes for anchoring the columns to concrete. The rest is a matter of assembly. Fig. 2 shows how columns are anchored to both concrete and wood. In the installation pictured on page 162, the columns were set over square bolt heads cemented in holes drilled with a star drill at the corners of the stoop. The square heads of $\frac{1}{2}$ -in. machine bolts fit perfectly inside the steel legs of the columns, and the weight of the columns prevents the legs from shifting off the bolt heads. The upper ends of the columns are ready-drilled for fastening with screws to a roof cornice. Matching brackets are designed to bolt to each side of the columns and screw to the underside of the cornice as in Fig. 6. That's all that is involved where the columns are used to support an existing porch roof. In the case of a carport or an unsheltered stoop, a suitable roof structure must be framed and covered. To avoid darkening the entrance, translucent panels of Rippolite (glass fiber) were used as a roof covering for the stoop installation shown. The details in Figs. 4 and 5 show how porch railings are joined to columns and masonry walls, and how newel posts of step railings are anchored to concrete and wooden porch floors. ★ ★ ★

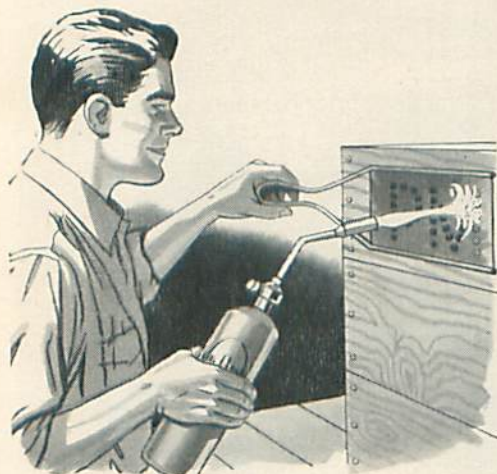


Nothing could be simpler to erect. The upper ends of the columns are ready-drilled for fastening with screws to the roof structure and for bolting brackets to the sides. Brackets fasten to cornice with wood screws furnished

One of several terrace-railing designs that are available. Note fancy grape-pattern panels of cast iron

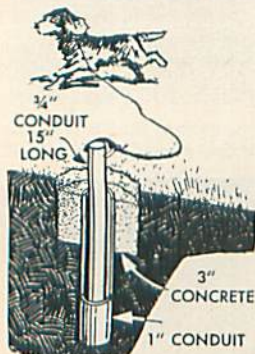


Identification Burned on Box With Stencil and Torch



Permanent identification letters or numbers can be burned into wooden boxes and crates with a torch and a sheet-metal stencil. The stencil is made by outlining the desired letters or numbers with a series of punched holes in the metal. It is best to do the punching with the metal laid flat on the smooth end grain of a wooden block, using a $\frac{1}{4}$ -in. center punch. A handle for the stencil is provided by bending the edges of the sheet metal over heavy wire shaped for the purpose. In use, the stencil is held against the wood so that the flame of the torch will char the wood exposed by the holes.

Tangleproof Dog Tether for Lawn Is Removed When Mowing



A tangleproof post on the lawn to which a dog can be leashed, and which will not interfere with mowing, can be made from two lengths of electrical conduit and a small amount of concrete. A 12-in. length of 1-in. conduit is sunk into the ground slightly below the surface. A shallow pit then

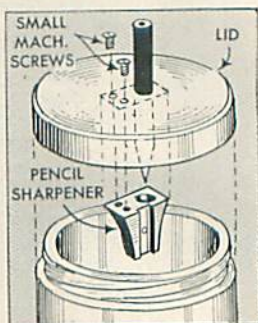
is dug around the upper end and a collar of concrete 3 in. thick poured around it. The collar should be below the level of the ground. A small amount of concrete can be dropped into the conduit and tamped with a square-end length of dowel to pro-

vide a bearing for the swivel post and to prevent soil entering the conduit. The swivel post is a 15-in. length of $\frac{3}{4}$ -in. conduit with a $\frac{1}{4}$ -in. hole drilled near the upper end to which the leash is snapped. In use, the swivel post simply is dropped into the 1-in. conduit. When the lawn is mowed it is removed.

Jack Jacobsen, Peotone, Ill.

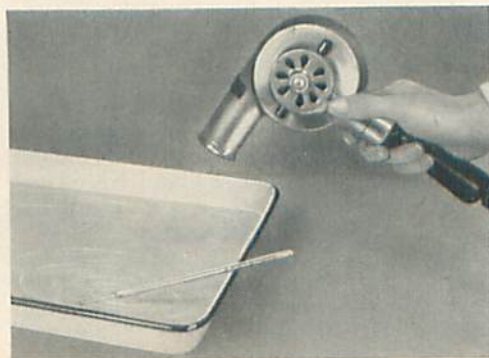
Hand Pencil Sharpener Under Lid Drops Shavings Into Jar

Wood shavings from a child's hand-held pencil sharpener can be kept off the floor if the sharpener is mounted on the cover of a mayonnaise or similar screw-top jar which will catch the shavings. Two holes are drilled and tapped in the end of the sharpener to permit fastening it to the inside of the lid with small machine screws. A pencil hole is drilled in the lid to align with the hole in the sharpener. For easier alignment, drill the hole in the lid oversize. Quite a number of pencils can be sharpened before it will be necessary to empty the jar.



Developer Temperature Adjusted By Air Stream From Hair Drier

A quick and convenient method of adjusting the temperature of developer for tray work is to use a hot-or-cold hair drier. Only a few minutes are required to either cool or warm the developing solution when the air stream from the drier is directed against the surface of the liquid. The rippling motion caused by the air thoroughly agitates the solution, assuring rapid dissipation or absorption of heat.



Bandsawed Shelves

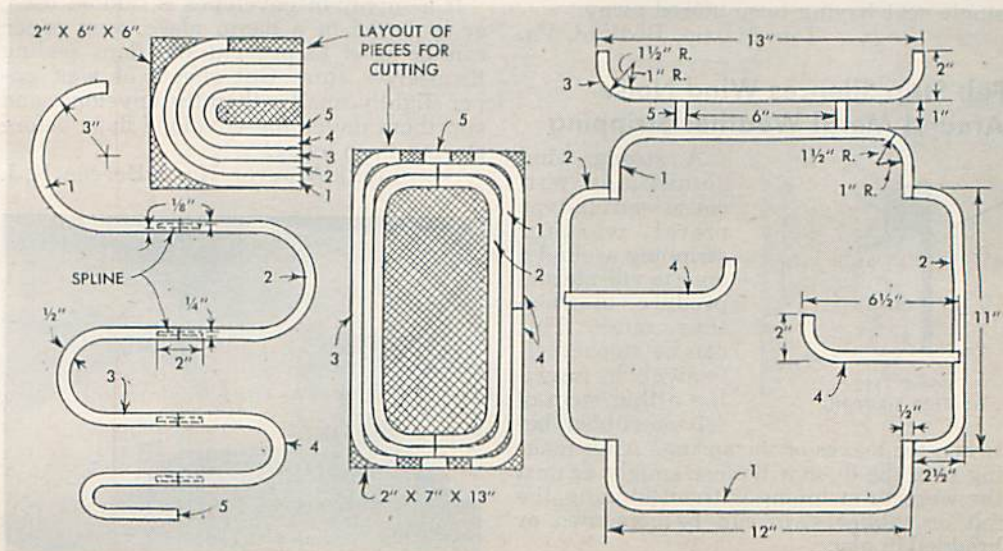
DESIGNED TO BE ATTRACTIVE, yet to require a minimum of construction material, these modern wall shelves are band sawed in sections from either hardwood or white pine. Hardwood may be stained and varnished, while pine looks best when lacquered. As shown in the details, careful layout is the factor that minimizes the amount of stock needed. The step shelf, shown in upper detail, is sawed out and assembled with glue and finishing nails, then sanded and finished. A hole is drilled $\frac{1}{2}$ in. deep, 3 in. from each end with a No. 30 drill, so the shelf can be hung on two

By
R. J. De Cristoforo



small nails driven into a wall. The compound-S-shaped shelf, lower left-hand detail, is assembled with splines glued into dadoes cut into the ends of the shelf pieces. The splines are cut from the same wood as the shelves and the grain is run parallel with the grain in the shelves when hardwood is used. Nails are not used in the assembly. After the glue is dry, wood putty

is used to fill irregularities between the splines and shelves. The "pagoda type" shelf in the lower right-hand detail is of more conventional design but the "wood saving" layout of parts is the same as for the other shelves. Dadoes for the two short horizontal shelves must be cut on a band-saw, because the shape of the parts prevents cutting them on a table saw.



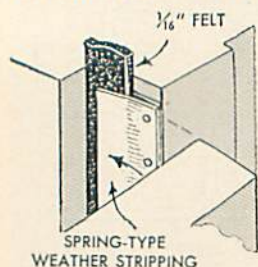


"Long Wheelbase" Baby Walker Accommodates Two Toddlers

With two toddlers in the family one father rebuilt a baby walker to accommodate both children by lengthening its wheelbase and fitting it with a double seat. The original walker first was disassembled and the seat and seat back were used as patterns. A 5-gal. oil can provided the material for the second seat back. The top edge was rolled over a length of light steel rod, the ends of which were extended and riveted to the back of the front seat to furnish hand rails. Rubber tubing was slipped over the rod before it was riveted in place. A length of 1-in. hardwood was used for the double seat. The footrest is cut from a piece of $\frac{1}{4}$ -in. plywood, fitted with brackets and riveted to front and back of the walker. Reassembling the original walker will be only a matter of minutes, the footrest and single seat having been stored away.

Tom Martin, Bedford, Va.

Felt Strip Silences Wind Noise Around Metal Weather Stripping

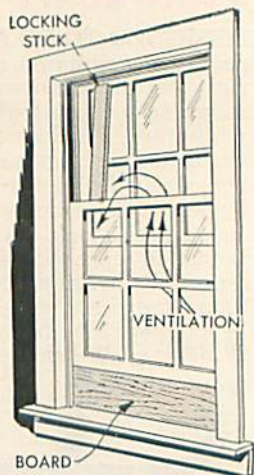


A strong wind sometimes will cause spring-type metal weather stripping around a door to vibrate and produce a whistling noise. This can be stopped effectively by inserting a thin strip of felt or rubber between the leaves of the spring.

After making sure the door will close snugly against the weather stripping without binding, the felt or rubber strip can be cemented or bradded in place.

Double-Hung Sash Propped Open For Draft-Free Ventilation

A double-hung sash can be arranged to give draft-free ventilation and yet keep out even a driving rain, by fitting a length of lumber or hardboard under the lower sash. The lumber is cut 6 in. wide and long enough to fit between the channels of the lower sash which is then forced down against it. Air circulating between the upper and lower sash provides the ventilation. A "locking stick" wedged between the upper sash and the top rail of the lower sash will prevent the window being opened from the outside.



Repairing Cracked Eggs

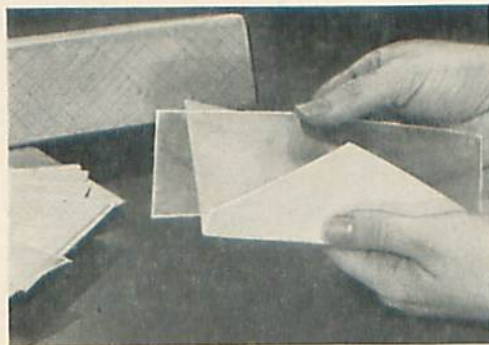
When eggs are cracked in the carton, you can prevent leakage and stop deterioration by sealing them with cellophane tape immediately. If repaired in this manner, the eggs will keep just as long as the unbroken ones.

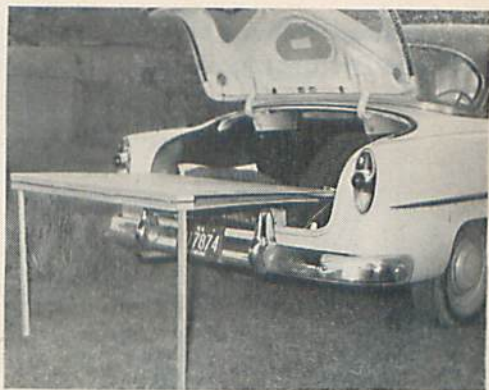
Blanche Campbell, Los Angeles, Calif.

Envelopes Kept Unsealed By Wax-Paper Inserts

If a supply of envelopes is seldom used, or is stored in a damp place, wax paper can be used to prevent the flaps sealing themselves shut. Cut sheets of wax paper slightly smaller than the envelopes and slip them under the envelope flaps before storing them away.

Frank A. Javor, North Bergen, N. J.

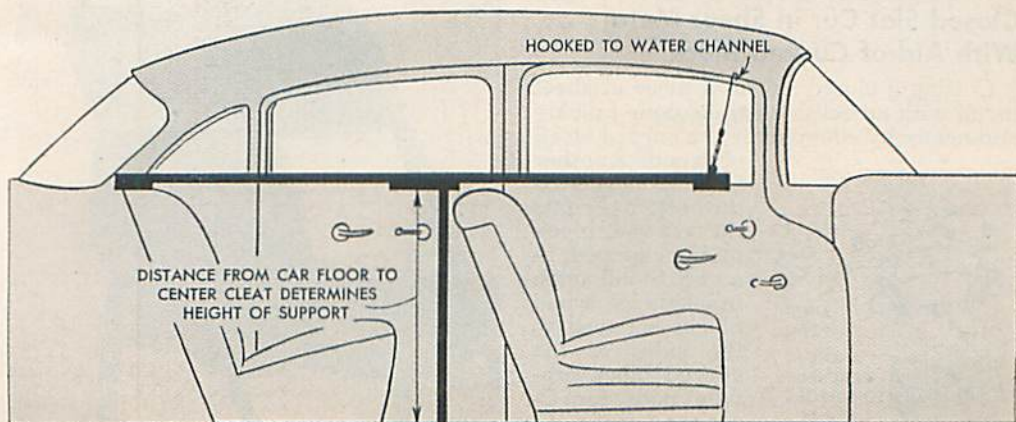
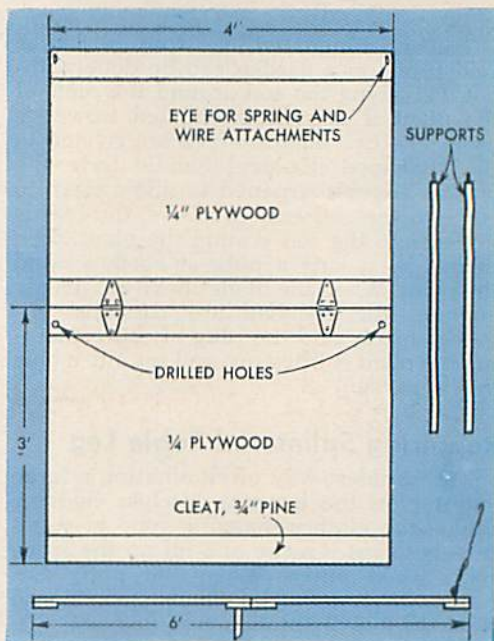




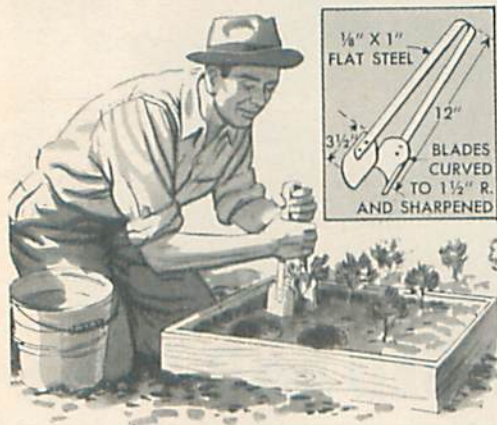
COMBINATION CAR BED AND TABLE

By Archie H. Slater

VACATION TRIPS by car this summer will cost less if you can sleep in the car, and those who have tried this way say it's more fun, too. Making a comfortable car bed to sleep two, such as the one shown here, is easy. Two 3 x 4-ft. sheets of $\frac{1}{4}$ -in. plywood are braced with battens and hinged together to lie across the tops of the car seats. When not in use, this bed folds out of the way behind the front seat and, as in the photo in the upper right-hand corner, can also serve as a portable roadside table. All the details for assembly are shown in the drawings. Once the bed is set up for the night in the car, two sleeping bags, a sheet of foam rubber or even a couple of comforters will provide a comfortable mattress. A pair of pillows and some blankets complete the bedroll. Setting up the bed at night is simple, requiring only 10 min., and taking it down in the morning takes only 5 min. The money you save in cabin rental will more than pay for the gasoline and oil on your trip.



Two-Bladed Trowel Transplants Without Disturbing Roots



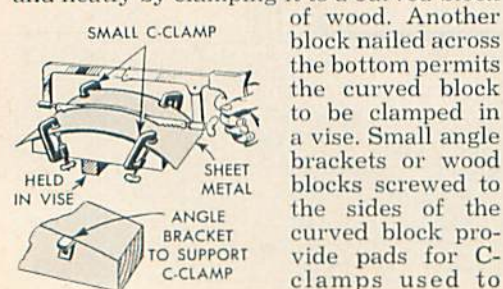
Transplanting seedlings from a flat or cold frame to a garden can be done without disturbing the soil around the roots of the plant if this double-bladed trowel is used. The two blades which are riveted to the U-shaped flat-steel handle have the bottom edges sharpened to allow them to cut into the soil easily. In use, the tool is forced into the soil around the plant, then turned so it cuts a plug of earth around the plant. When the blades have cut deeply enough, the handles are squeezed together firmly and the plug of soil containing the plant is lifted out and set into a hole in the garden.

Repairing Splintered Table Leg

The simplest way of eliminating a large splinter on the leg of a kitchen chair or table—the clothes-snagging type of splinter—is to cut it away and fill up the space with wood putty. When the putty has hardened completely, sand smooth and paint to match the leg.

Closed Slot Cut in Sheet Metal With Aid of Curved Block

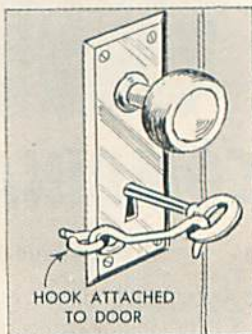
Cutting a closed slot in a piece of sheet metal with a hacksaw can be done quickly and neatly by clamping it to a curved block



hold the sheet metal. With the sheet metal held flat, scribe the slot to be cut, then clamp it to the block and use a fine-toothed hacksaw blade. The ends of the slot can be cut with a narrow cold chisel. An alternate method is to drill a hole in each end of the slot before it is sawed.

Screen-Door Hook Holds Key To "Burglarproof" Lock

A practical way of "burglarproofing" a door lock of the older type that can be opened with a skeleton key is to hold the key in the lock with a screen-door hook. The hook is attached to the door to fit snugly into the eye of the key when the latter is turned in the locking position. The key then cannot be turned from the outside with long-nosed pliers, nor pushed out so another key can be used.



Seat Rack for Man's Hat Is Pocket-Sized

A simple holder consisting of a spring-type clothespin and a length of drafting tape will permit hanging a man's hat when attending a meeting where the seats are not provided with hat racks. The tape is stuck to the inside surface of one leg of the clothespin, then down the outside. The holder now can be carried in a pocket without trouble from the adhesive. In use, the tape on the outside of the pin is pulled loose and stuck to the back of the seat ahead.



ILLUMINATED VALANCES

ONE OF THE MOST interesting features of home lighting during the past few years has been the trend toward illuminated window valances. Valance lighting is popular for several reasons: It provides general room lighting which is excellent when used together with table lamps, and just right for television or conversation when used by itself. It also enhances the appearance of draperies and makes the room seem larger.

The lighting experts of General Electric Company recommend "deluxe warm white" as the best type of fluorescent lamp for this purpose. This lamp results in the most pleasing effect on complexions, draperies and furnishings. A minimum of 16 ft. of lighted valance—either singly or combined—should be used in the average living room for best results, and single valances should not be less than 4 ft. long.

All that is needed to make a valance is one or more fluorescent channels and lamps, enough extension cord to reach the nearest wall receptacle, 1 x 2 backing strip for the channel, 1 x 8 lumber for a face board and endpieces, decorative molding, two 4-in. angle brackets and necessary screws. The face board is mounted 6 in. from the wall and 10 in. below the ceiling.

As shown in the photos, the fluorescent channel is fastened to the backing strip after the latter has been screwed to the window trim or wall. The face-board assembly simply is hung in front of the channel by fastening the angle brackets to the upper edge of the backing strip.

After face board and endpieces of valance have been assembled, an angle bracket is screwed to the inside of each endpiece. Brackets are fastened to 1 x 2 strip

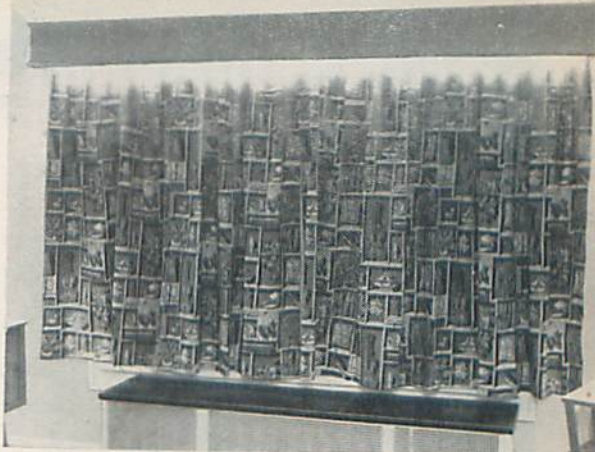
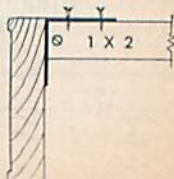


Photo above gives some idea of effect of installed valance. Note light cast both upward and downward



Backing strip is screwed to wall or trim above window and fluorescent channel is fastened to strip, above. Face board is hung in front of channel as below

Information and photos courtesy General Electric Co.





Nine-foot, floor-to-ceiling picture window is tipped into place like a wall section after assembly on floor

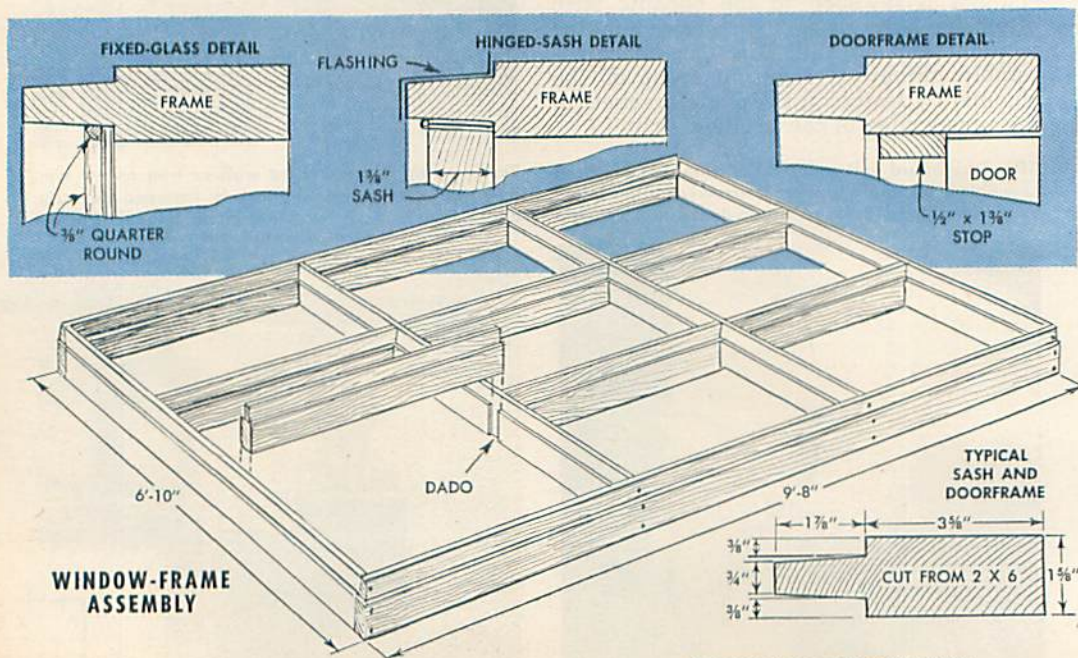


By Richard F. Dempewolff

PART III

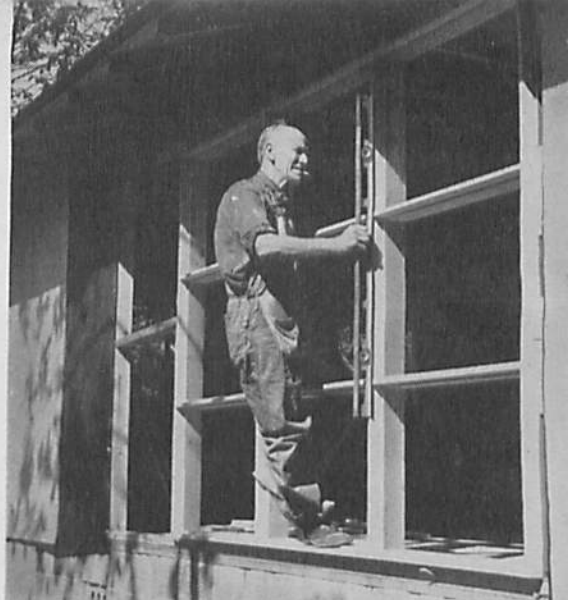
THE *PM* PRECUT HOUSE

PREVIOUS INSTALLMENTS of this article described the unique feature of *PM*'s precut house that allows the builder to finish it in almost any conceivable floor-plan arrangement. Architects Wilson and Christie designed a giant "picture frame" for one long wall, in which a series of windows and panels can be swapped back and forth to suit any interior-partition plan. Picture windows on the other long wall can be shifted back and





Builder makes his own window frames from milled material included in kit and then fits sash in place

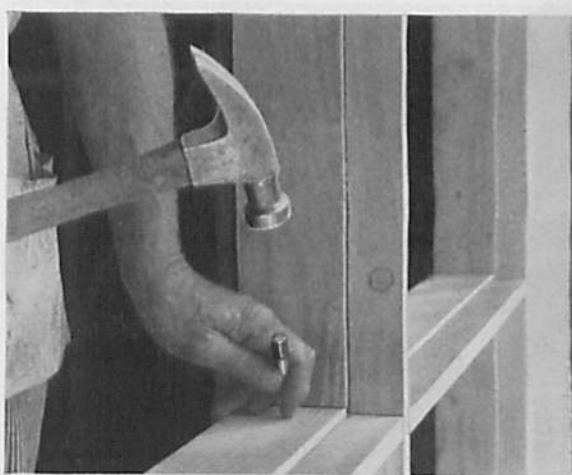


Finished frame for picture window is plumbed in position, shimmed where necessary and nailed securely

forth in 16-in. jumps to conform with a wide variety of room plans. End-wall openings must remain where they are, since the graduated studs in the kit are cut to fit only the locations shown for them. But doors may be swapped for windows, and vice versa, without hurting anything, and there's no law to prevent you from eliminating any end-wall window or door. Just buy the extra material to jack-stud the opening and wall it over. To maintain the utmost flexibility in this business of wall openings, and also to save hundreds of dollars in cost, the door and window-framing material in the PM pre-cut kit is one of the few items that you must cut and fit yourself. Actually, it's easy and fun to do. In the kit, the 2 x 6 framing material comes milled and planed to the profile shown in the cross sections on the opposite page. The same material is used for every door and window frame in the house, and the same techniques are used in building and placing all finished frames. Pictures and diagrams on these pages provide a general idea of the simplicity of the design and procedure involved.

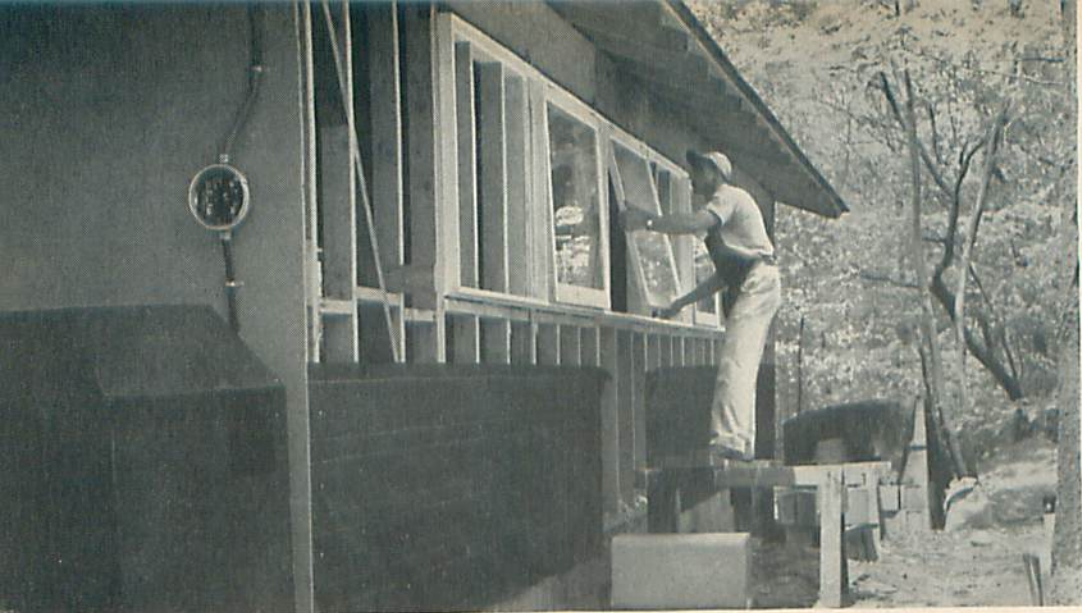
Though you can switch panels and windows in the 28-ft. frame on the long wall after the shell is finished, it is much easier to establish the floor plan you want when you start and place windows to conform with it. Besides, windows and doors on the other three walls are not easily moved once they're in place.

Making frames grows easier with practice. It's a good idea to start with a single window for one of the end walls. The unit can be made flat on the floor. Horizontal framing members are cut to the width of the rough opening, and mortises are



Above, horizontal members in picture window are toenailed to the verticals, countersinking nails. Below, with windows set in frames desired, remaining panels are jack-studded and sided over with Homasote





Window frame is made to fit sash when it is assembled. Sash are hung in place after the frame is installed



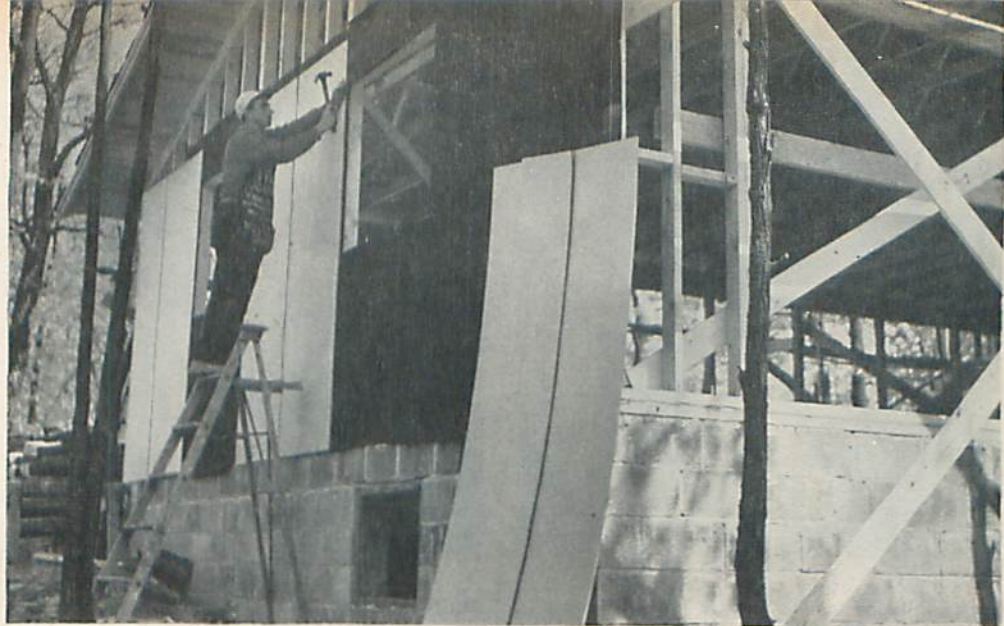
Above, doorframes are of the same stock as the windows and are fitted with aluminum sills at bottom. Below, the fireplace is planned in stage 1, but it is built in stage 2 or 3. Fireplace is not included in kit



notched in them for the vertical members so the $3 \times 3\frac{1}{2}$ -ft. sash in the kit fits snugly against the rabbeted stop all the way around. Windows are more easily fitted before installing the frames. The finished frame is then set in the opening, shimmed and plumbed so it is perfectly square and level, and the window is hung in it.

Making the 28-ft. window-panel frame for the long wall requires mortising vertical members into the long horizontal members like rungs in a ladder lying on its side and toenailing them in the mortises. Though the lip looks continuous for the entire length of the unit, the frame is actually made up in 8 to 12-ft. sections at a time. The horizontal pieces are cut around the double 2×4 posts in the wall so the lip runs continuously across the front of each post. The ends of the lips for each section butt the lip ends of adjoining sections where they meet in front of the posts. Each section is blocked or shimmed in place until the entire assembly is complete. Then it is checked for plumb and level. Windows are fitted in frames where desired and the other openings are jack-studded, as shown in the lower photo on page 173, and covered with siding-panel material.

You may want to throw away two standard sash and put in a double-size window for a dining alcove, or the kitchen. It's easy. The upper half of any double 2×4 post in this wall can be cut out. Just eliminate the vertical framing members at that point, put in a pane of fixed glass to fill the hole and putty it in place against the rabbeted stops with $\frac{3}{8}$ -in. quarter-round molding. There is nothing to stop you from making any window arrangement you want in this wall—half-size sash, double-size, off-size, off-center or on the module. Just



Homasote siding panels go up quickly and fit snugly into outside rabbet of all door and window frames

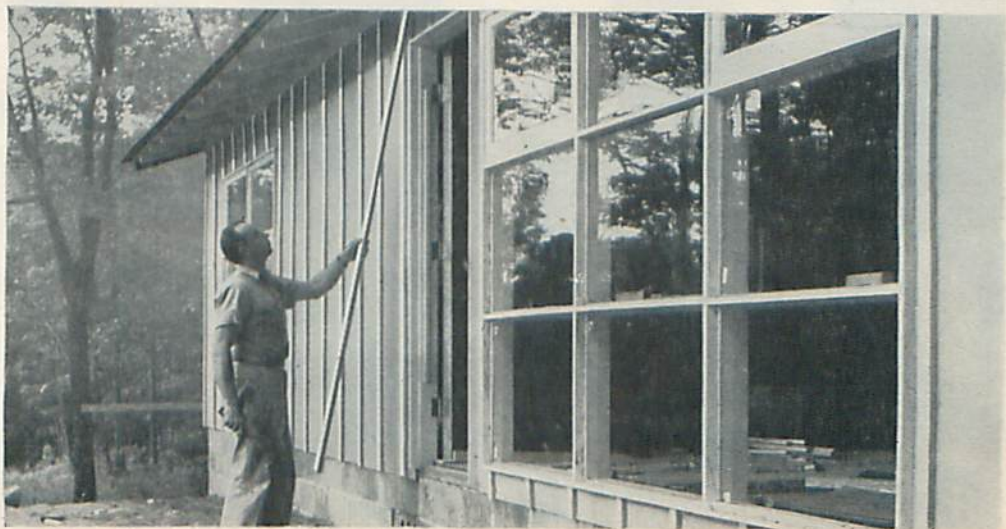
put in the vertical framing members where you want them, fit your sash or glass and jack-stud the in-between spaces for siding panels. The only limitation is that you must not cut away any two of the double studs in a row. Your big wall header is designed to span 10 feet unsupported, but no more.

As shown in the diagram and pictures at the beginning of this article, the big picture windows are made by mortising the vertical members into the top and bottom pieces. Short horizontal members are then slotted into the uprights. It's a good idea to use a sample sash or fixed glass pane to test the size of each window light before nailing the frame together. With the frame in place, fixed glass is set in beads



Open spaces between rafter ends are covered by a notched 1 x 6 board that slides up against eave

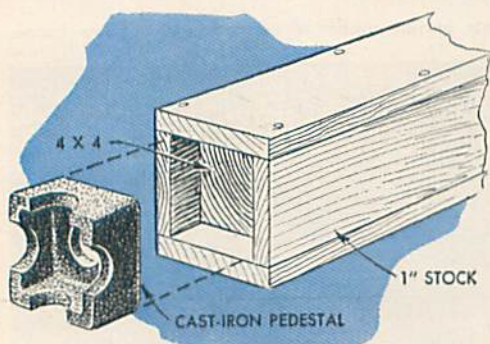
Batten strips of 1 x 2 are nailed to every stud and through the siding to cover seams and hide nailheads





Porch and rear gables of house must be blocked to provide backing for this wooden mitered frame . . .

. . . which becomes a nailing rim for the metal louvers that keep attic cool in summer. Louvers are in kit



Cast-iron pedestal, which comes with kit, fits bottom of each built-up porch post to prevent wood rot

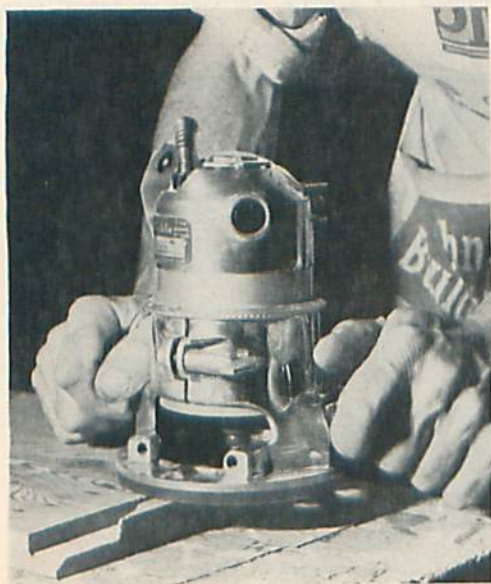
of caulking applied with the gun supplied in the kit, and the awning sash is hung in designated lights with two butt hinges.

Doorframes are constructed like the single windows, except that an extruded-aluminum threshold takes the place of the bottom framing piece. This modern innovation eliminates all need for fancy, fitted sills. The aluminum units are screwed right to the floor boards. Doors are fitted and hung flush with the inside edges of the frames after they have been plumbed and secured in place.

With door and window frames in place,

Portable electric router like this one does quick and neat job of mortising window and door members

Porch roof is raised with screw jack and propped with pole to set built-up columns in position under headers



and flashed as required, the rest of the shell zooms to completion. Homasote-siding panels in 16, 32 and 48-in. widths are secured in place with ridiculous ease. Four-ft. widths are used on both sides of each corner of the house. Aside from that, the varying widths can be put up at random to allow multiple seams for expansion and contraction. Some cutting and fitting are required to bring panel material tight against the outside rabbeted corners of the door and window frames, but the standard panel widths will land squarely on stud centers for easy nailing if your framing was accurately done. Lengths of 1 x 6 provided in the kit are notched to fit around the rafters and block the spaces between them. Since most rafters are always a little out of true due to warping, such blocking must be custom-built on the job. But by using a good sliding square, two men can mark and notch the boards to fit in a few hours. With the blocking in, batten strips are nailed over every stud, covering nailheads and seams in the siding sheets.

Next come the gables which, for variety and snug appearance, are covered with beveled siding. Angle-cut ends that fit against the roof slope are easily marked and cut on the ground. A carpenter's square, with the 24-in. and the 8-in. marks aligned on the bottom edge of the board, will give the proper angle to conform with the 12-4 pitch of the roof. Louvers, supplied in the kit, are cut into the peak of each gable.

Next, the porch slab is formed 4 in. thick, sloping downward 2 in. in 10 ft. for drainage. A rented mixer will pay off on this job, and it can be done in a day. The slab may be surfaced with flagstone, as was done in the prototype house, or it can be

screeded and troweled in a smooth cement surface. With that done, the terminal ends of the 2 x 12 headers holding the porch roof are raised with a screw jack and any kind of stout timber—and the permanent 4 x 4 porch posts are set in place. The cast-iron pedestals that hold these posts off the porch surface and prevent rotting are secured to the post bottoms beforehand.

This completes the shell of the house. You'll want to protect it with a good grade of paint. One nice thing about this house is that the whole thing can be painted from a stepladder. Another is that, except for door and window frames and eaves, the entire surface can be painted with a roller. Adequate protection calls for a good prime coat and two more coats of high-grade exterior paint. With the house painted, you can use this shell for "camping out" until you're ready to proceed with the interior-finishing job. You can be as elaborate or as simple as you wish, depending on your time and purse. But for as little as \$2000 more, this can be a neat, modern home packed with built-ins, every necessary modern convenience and luxurious natural-wood paneling. The concluding article next month will describe some of the many possibilities you can achieve for that amount of money.

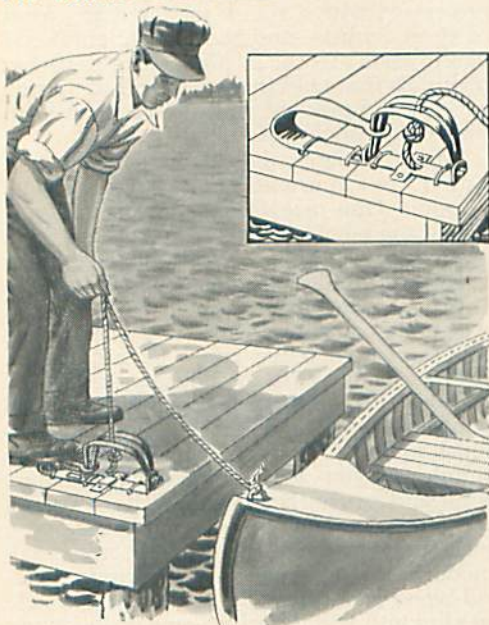
Detailed Book Shows How

In addition to a 128-page instruction book which shows you step by step how to build the precut house, there is a complete set of blueprints available. Write: Blueprint Department, Popular Mechanics Magazine, 200 East Ontario St., Chicago 11

Flagstone surface tops concrete base of porch floor. Long wooden straightedge is used to keep stones even



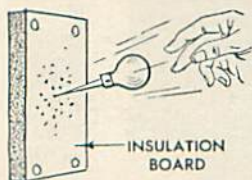
Steel Animal Trap Used As Small-Boat Hitch



A steel animal trap is used by one small-boat owner as a quick-acting hitch on a dock. Any single-spring trap, size No. 1 or larger, can be used. It is nailed to the dock, after the chain, pan and brackets have been removed. To "tie up" a boat, step on the trap spring to open the jaws, drop the knotted end of the tie rope into the jaws and release the spring. Releasing the tie rope is done by reversing the procedure.

Joseph W. Johnson, Centerville, Iowa.

Insulation Board on Shop Wall Holds Brad Awl Handy



A bradawl and other sharply pointed tools can be kept handy in the workshop if a scrap of insulation board in which they can be stuck is tacked to the wall. A flip of your hand will spear the point of the tool into the soft board, where it is both visible and convenient at all times.

Storing Storm Sash and Screens

One efficient way of storing screens and storm sash in a basement or garage is to use regular sash hangers screwed to the overhead joists. This method keeps the screens and sash off the floor and away from possible damage. Also, they are thor-

oughly ventilated so they will not become damp and subject to rot. If the hangers are spaced correctly, it is possible to paint both sides of the sash while they are hanging in storage.—Frank A. Bartonek, Kansas City, Mo.

Bracket for Paste Brush Keeps It Inside Pail

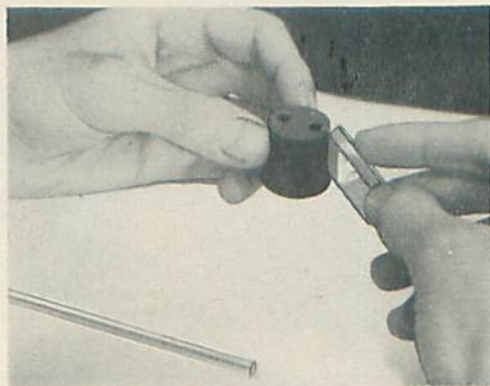
Instead of laying a wallpaper-paste brush across the top of a pail, which permits the paste to run down the outside and onto the floor, use this flat-steel bracket. It can be bent from a strip of $\frac{1}{8}$ -in. flat steel or heavy sheet metal. The dimensions will vary according to the size of the pail. Besides supporting the brush inside the pail and above the paste so it does not become saturated, the bracket also can be used to scrape off excess paste.



Stopper Slit With Razor Blade Prevents Tubing Breakage

Amateur chemists faced with the problem of forcing fragile glass tubing through holes in a rubber stopper can reduce breakage by slitting stopper between the holes and the edge. Do not slit the top eighth of the length. When the stopper is fitted into a piece of apparatus the slit will be forced shut and the unslit section will maintain a complete seal.

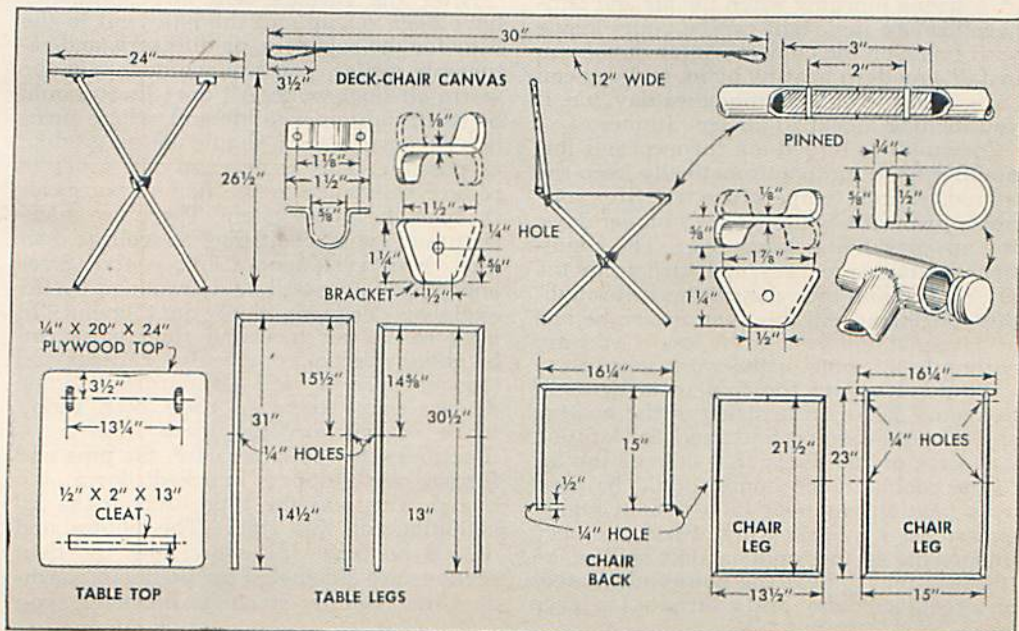
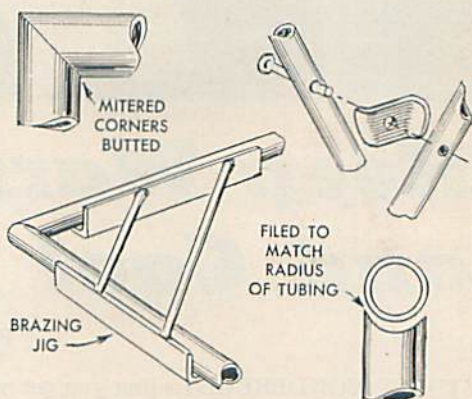
H. Hanscom, Elmhurst, Ill.

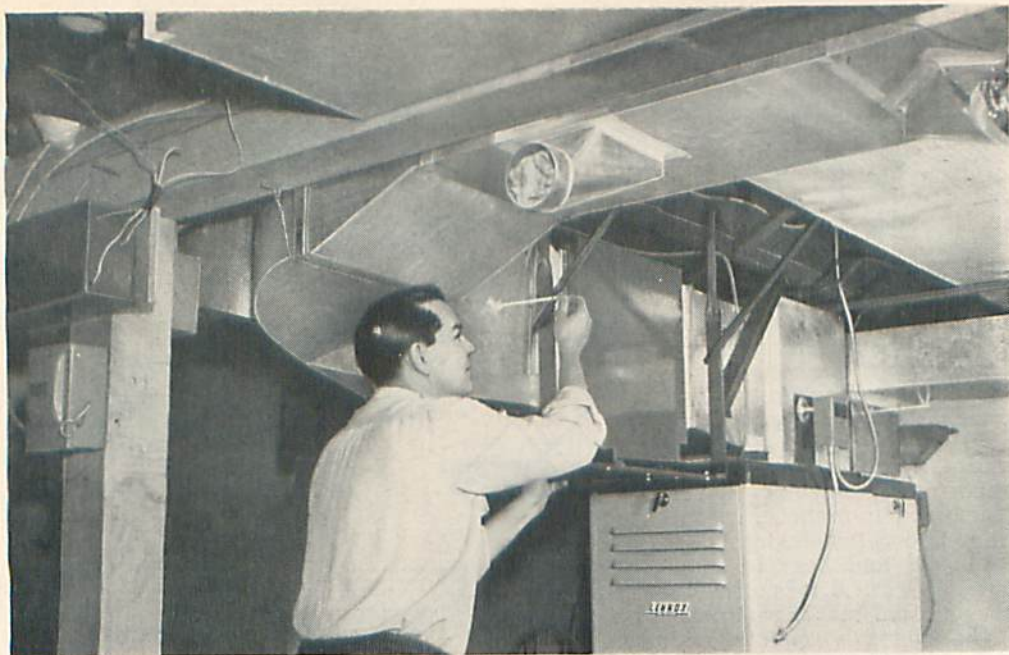


As a safety measure, paint a white stripe on the front edge of each stair tread in dark attic or basement stairways.

FOLDING CAMP SET

THIS FOLDING CAMP SET can be one of the most useful projects to come out of your home workshop. It is easily folded and packed in the trunk of a car for use at summertime picnics and week-end outings, and is equally handy for backyard snacks. The canvas on the chairs is quickly removed for washing. The table top is $\frac{1}{4}$ -in. plywood, while the clips for holding the legs on one side of the top are either sheet-metal strips bent to shape or regular pipe clamps. The brackets on the legs of the table and the chairs are cut from $\frac{1}{8} \times 1\frac{1}{4}$ -in. flat steel and bent to shape. Seamed-steel tubing, $\frac{1}{2}$ in. i.d. $\times$ $\frac{5}{8}$ o.d., was used in making the original set. If seamless tubing is used, $\frac{3}{4}$ -in. tubing is required to insure sufficient strength. In the latter case, dimensions for brackets, pipe clamps and end plugs must be modified for the larger-diameter tubing. The brazing jig, upper detail, is two lengths of angle steel held at right angles by two welded rods. It holds either size tubing for brazing the mitered butt joints. The top crosspiece of the smaller chair leg is cut in the center and a steel rod is fitted inside and held with removable pins, as shown in the detail. Removing the rod permits the canvas to be pulled through the cut.





Keep Warm in Winter and Cool in Summer

PART II

THAT WONDERFUL feeling you get on a spring morning when the air and temperature are just right can be yours inside your home on the coldest winter day if you install a modern heating plant, and you can have it on the hottest, muggiest day, too, if you include a central air conditioner.

In winter a forced-air furnace and humidifier team up to automatically keep the humidity and temperature inside your home just right, while on hot summer days, the air conditioner takes over. The conditioner removes excess moisture from the air, cools it and then distributes it throughout your home. All this comfort can be had at a reasonable cost, even less if you are willing to do some of the work yourself.

As described in the first installment of this story last month, sizing of the heating and air-conditioning units and the location and sizes of the ducts that deliver the air to the rooms in the home should be done by a heating engineer or a person highly experienced in this work. Sizing is very important, as too small a unit will make it impossible to heat the house adequately on a really cold day, and a furnace too large

will increase your initial cost considerably.

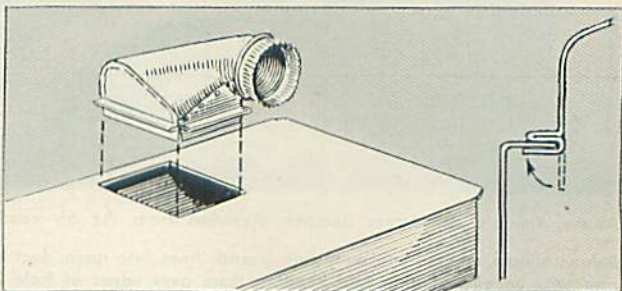
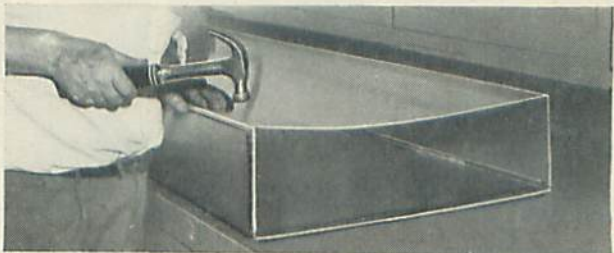
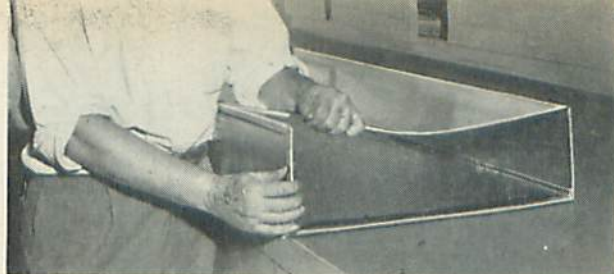
After the furnace and air conditioner have been set up and the holes cut in the floor for the registers, or diffusers, and return-air grilles, you are ready to run the warm-air-duct work. All duct lines should be as straight as possible and, where turns are necessary, they should be as gradual as possible. This is necessary in order to reduce resistance to the flow of warm air through the duct system. There are many sizes and types of fittings as well as duct pipe, both rectangular and round. Sizes and type of pipe will be determined by the engineer designing your duct layout. In most cases, the necessary duct work can be obtained from your dealer. Fittings and pipe are pretty well standardized. Some dealers make them in their own shops, while others purchase them from manufacturers. In the latter case, the pipe and fittings are shipped knocked down and boxed. This was the type used in the installation for this story. The photos and details on page 181 show how the duct sections are assembled for the main warm-air line. Before starting, however, you

should get two pairs of tin snips, one for straight cutting and one for curved or circle cutting. Purchase high-quality snips. Also, you will need a hand sheet-metal flanging tool. Since it is almost impossible to design a duct layout to fit perfectly, it will be necessary to cut or shorten at least one or two duct sections, and you will need the flanging tool to form flanges on the cut ends of the sections. You also need a supply of sheet-metal screws. Sometimes it is advisable to lock duct joints with one or more screws. In other cases, you may find it advisable to attach duct parts directly with the screws as, for instance, the plenums to the furnace housing, or the flexible duct connectors to the housing of the air conditioner.

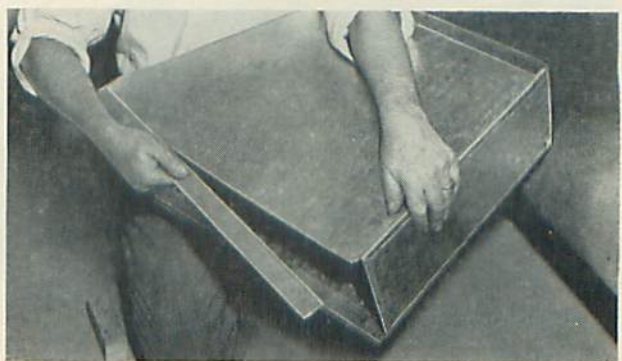
Start assembling the duct lines from the furnace or air conditioner toward the diffusers. Study the layout carefully first. If some joists are to be panned to provide return-air ducts and the warm-air ducts pass under them, it may be necessary to prepare the joists first. If you are inexperienced, make the measurements carefully and then recheck them before cutting the ducts. Sheet-metal duct work is fairly expensive so be sure your measurements are correct, otherwise you may ruin some of it.

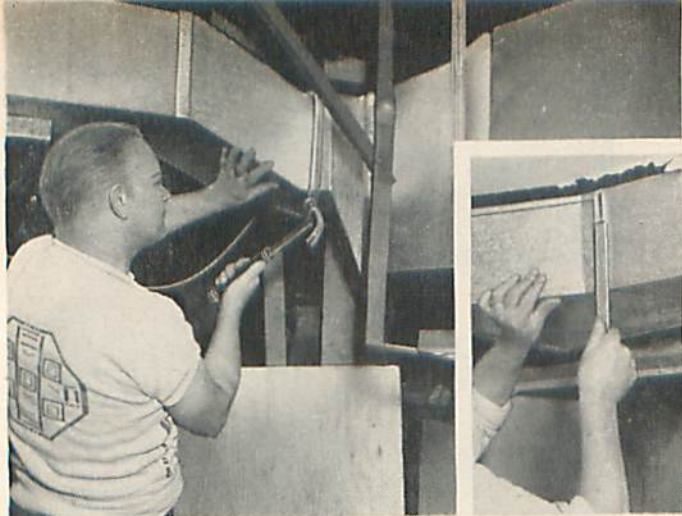
If a main rectangular warm-air duct line is used, as in this installation, connectors for the 4-in. branch lines that run to the diffusers are installed in the main duct as shown in the detail on this page. Holes must be cut in the main duct for the connectors. These can be inserted in the top, bottom or side of the duct, depending on the requirements.

The duct sections are assembled with S-strips at the top and bottom, lower photo this page, and with drive strips at the sides, upper photo page 182. The S-strips slip over the abutting edges of both sections and the drive strips fit over flanges at the sides of the two sections as indicated in the insert detail, page 182. The drive strips project about 1 in. at top and

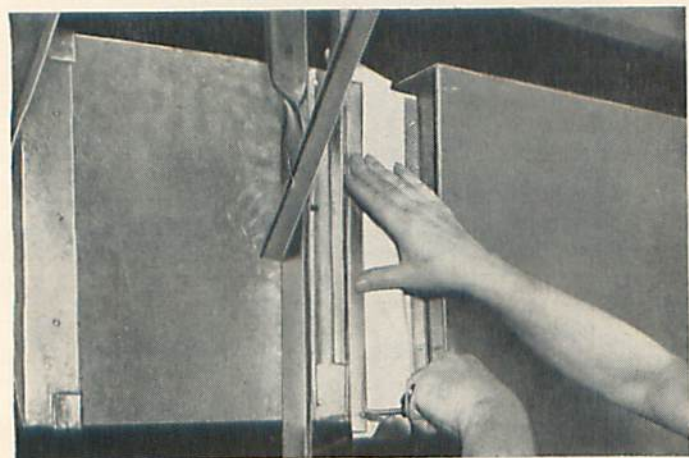


Packaged ducts and fittings are shipped knocked down and are assembled in sections as above. Drive strips and S-strips lock assembled sections rigidly together. Two pairs of tin snips, one for cutting circles and one for cutting straight lines, and a hand tool for forming flanges on ends of duct sections if it is necessary to shorten them, will take care of your tool needs. Branch-line connectors are locked in holes cut in ducts as above



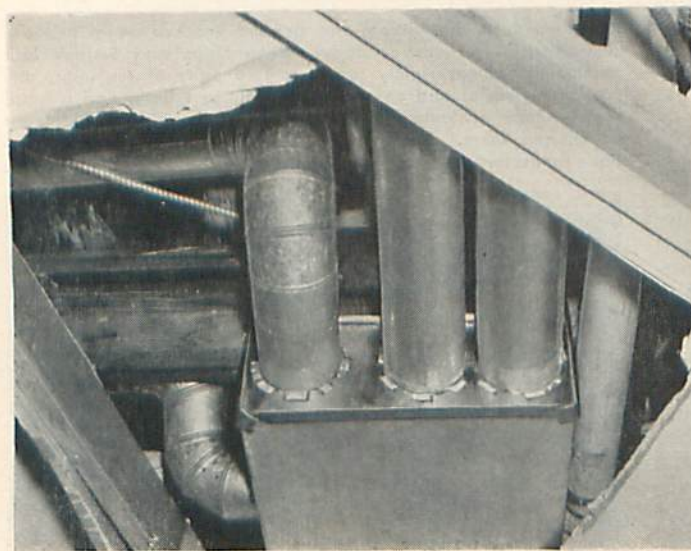


Drive strips slip over flanges on sides of duct sections to lock them together rigidly. Strip ends are bent over to lock the strips in place



Above, flexible connectors dampen vibration from the air conditioner

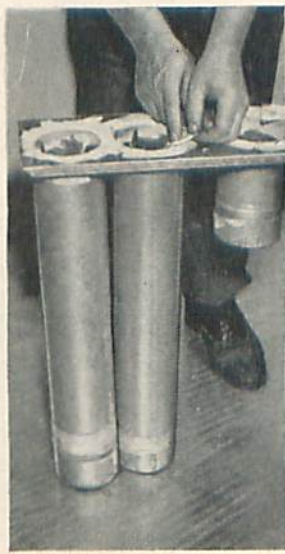
Below, simple method of connecting branch lines into main duct by cutting tabs on end of pipe and bending them over edges of hole in duct

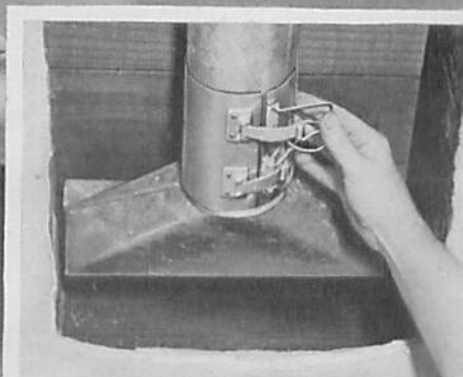
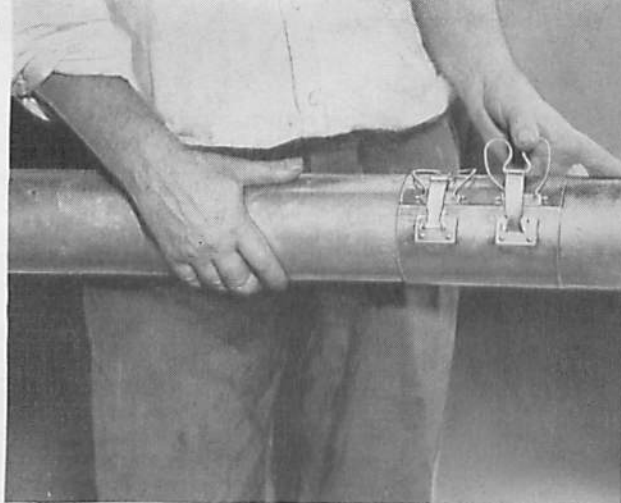


bottom and are bent over against the top and bottom of the duct. These two types of strips provide rigidity and make the duct practically airtight, which is important in a forced-air system.

Flexible connectors are used in the duct line on both sides of the air conditioner as pictured in the center photo, this page. These are necessary to prevent vibration of the unit from being transmitted to the duct line, which would set up noise in the line. Be sure to use them, especially where the conditioner is set in the line as in this installation. They may be unnecessary where a vertical-type air conditioner sits beside the furnace and air delivery from either unit is directed into a single plenum by means of a damper arrangement.

It is always best to use special connectors to take branch lines off the rectangular main-duct line as they are designed to offer the least possible resistance to the flow of air. The connectors are available in shapes that come straight out from the line or at different





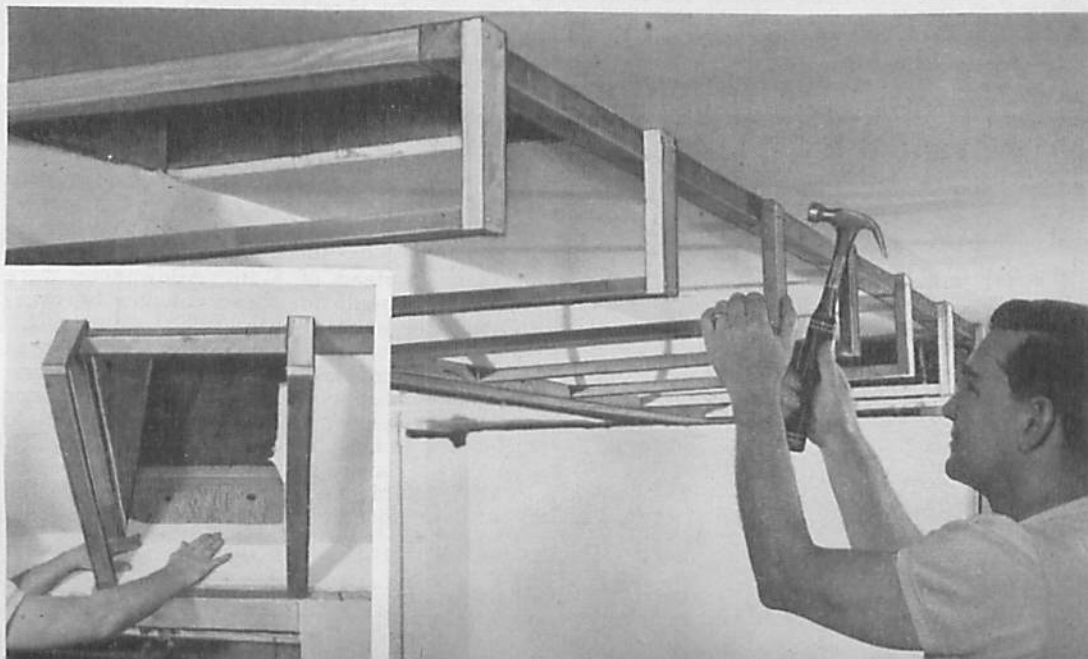
Snap connectors are used to join sections of round pipe together, or to join the pipe to the diffuser boots

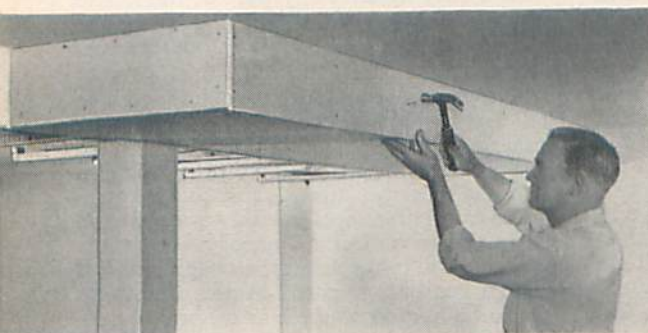
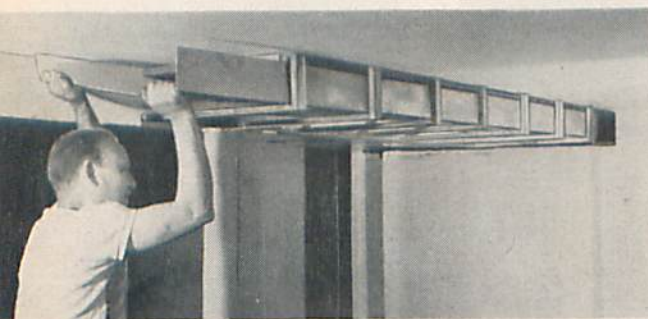
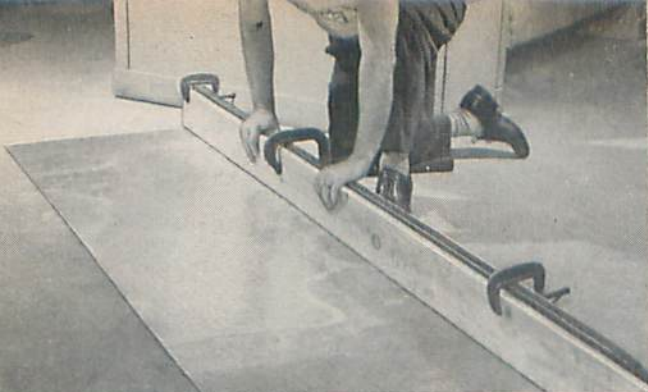
angles. However, in some cases, space may not permit their use. Should you experience this situation, the branch-line pipe can be connected directly to the main duct as shown in the lower photo page 182. Here, three 4-in. round branch lines had to come off the end of the main-duct line and space did not permit use of connectors. Holes to take the pipe were cut into the duct line, after which the ends of the round pipe were cut to form tabs 1 in. long and $\frac{3}{4}$ in. wide. Alternate tabs then were bent at right angles. After inserting the pipe in the hole, the remaining tabs were bent down against the duct. With half the tabs pressing against one side of the duct and the other half pressing on the opposite side, a good connection is made. Asbestos tape applied with regular wallpaper flour paste seals the joints airtight as shown in the lower right-hand photo on page 182.

Special snap, or sleeve, connectors are available for connecting the sections of round pipe together, or to the diffuser boot as shown in the upper photo, this page. Special hangers also are available for suspending all duct work, which should not press tightly against any part of the house as in expanding and contracting the metal will move slightly and thus make the duct system noisy.

After the warm-air-duct work is in place you are ready for the return-air ducts. Referring to the layout plan shown in the first installment last month, you can see how this was done. Notice that two return-air grilles were used upstairs and one in the basement. Normally, return-air would not be taken from the basement, but a large recreation room in the basement was to be heated as well as a home workshop. This made it necessary to take some

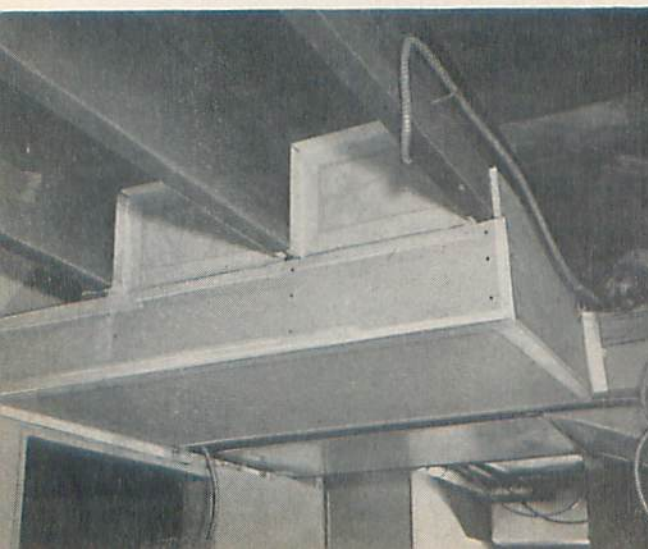
Simple framing of 1 x 2-in. stock nailed to ceiling is used for homemade return-air duct in playroom





Above, improvised brake for bending metal lining in home-made duct. After inserting lining into duct framework, latter is covered with ceiling material and joints sealed with tape

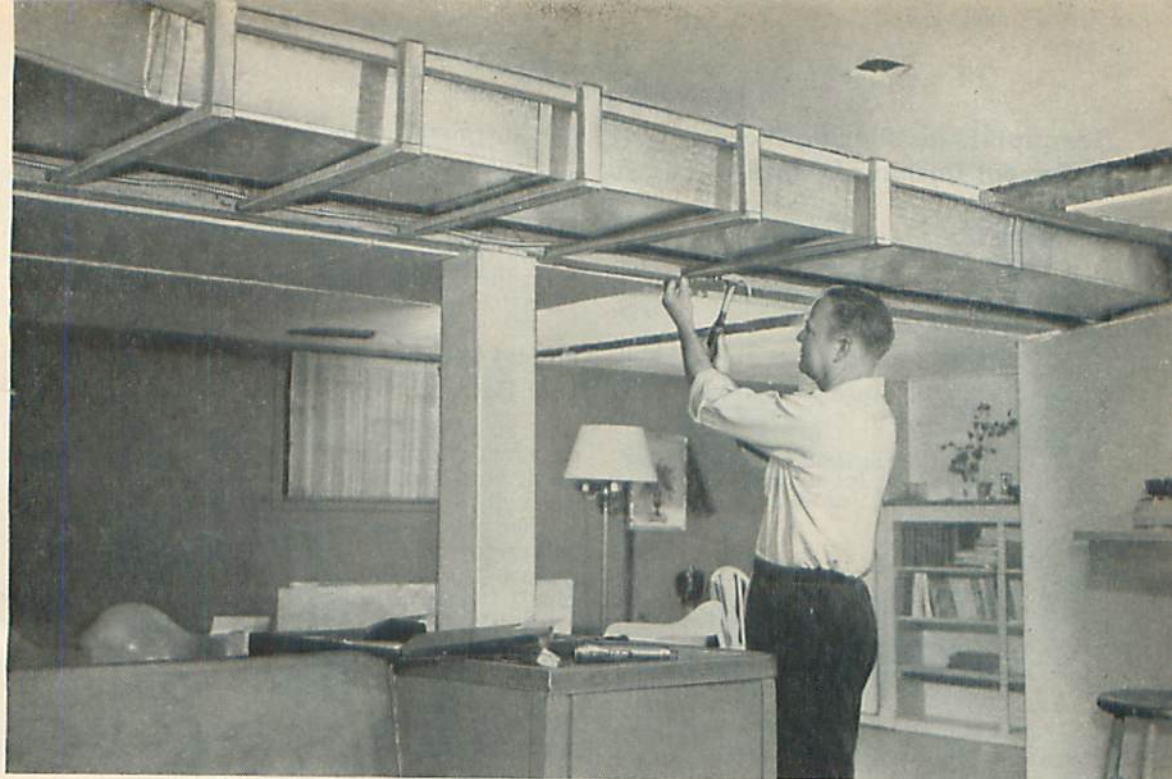
Photo below shows how the spaces between panned joists that were used as return-air ducts are blocked with plywood and sealed with asbestos tape to provide airtight duct spaces



of the return air from the basement. Notice that some outside air enters through an 8-in. round-pipe duct. While this is not absolutely essential for heating, it is sometimes recommended for additional fresh air in the home. You can begin the return-air-duct work by installing a plenum on the air intake of the furnace and run the ducts from this. Naturally, practically all installations will differ in layout, but the information given for the layout in this installation can be adapted to others. Notice that wherever possible, joists were panned (covered with sheet metal) to serve as ducts. In this case, spaces between two joists on each side of the furnace were panned and fed into a 20 x 8-in. sheet-metal duct which, in turn, led to the return-air plenum. The 8-in. pipe duct to bring in the outside air also feeds into this duct, and is fitted with a sheet-metal butterfly-type damper to adjust the amount of outside air pulled into the return air. Connections of the rectangular duct to the furnace plenum and to the panned joists can be made by the tab method as previously described, sealing the joints with asbestos tape inside and outside. When cutting holes in the rectangular duct and in the sheet metal under the joists, make them the full width of the duct and the full widths of the spaces between the joists.

Normally, it is best and easier to use sheet-metal return-air ducts but, if desired, they can be made of other materials. Although shown on the layout as a 20 x 8-in. metal duct, the return-air duct from the grille near back of the house was made as shown in the lower photo on page 183 and the three upper photos on this page. A low ceiling in the recreation room made it advisable to have the duct only 6 in. deep instead of 8 in. Allowances were made for these changes by oversizing slightly.

Since the basement ceiling was covered, the grille opening was cut lengthwise between two floor joists, which serve as a duct to carry the air to the main duct. The space between the joists must be blocked off at each end for the portion that serves as a duct. This



Warm-air duct in playroom is framed and covered with ceiling material to blend it into the ceiling line

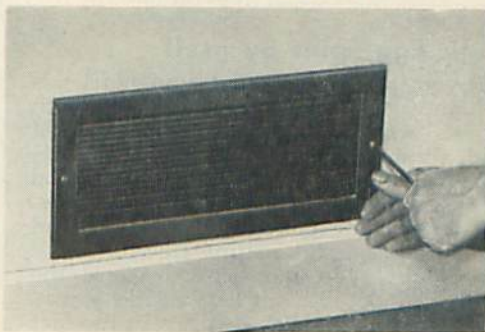
was done with plywood and then sealed with asbestos tape as shown by the insert in the lower photo on page 183. Notice that the ceiling material was cut away directly above the main duct. Since the basement ceiling would serve as the top part of the main duct, it was only necessary to frame as in the lower photo on page 183. A sheet-metal lining was then inserted inside the framing, as shown on page 184, to provide a smooth surface for the flow of return air. The metal was shaped with a metal brake improvised by clamping two long boards over the work as shown in the upper photo on page 184. Nailing the ceiling material over the framing as in the center photo completed the job.

The lower photo shows the end of this duct terminating under the panned joists. Notice how the joist spaces are closed with plywood and taped with asbestos. Also, notice that all joints of the homemade duct are taped to prevent air leakage. If the duct is not tight, the furnace blower might pull too much air from the basement and not enough from upstairs, thus upsetting the heating balance. Remember that the return-air-duct system acts somewhat like a suction line and must be tight. The warm-air-duct system should be reasonably tight also. With both duct systems airtight, the warm air, when heating, or the cool air, when air conditioning, is delivered where it is needed.

The photo shown at the top of this page

shows how the warm-air-duct system was framed in the recreation room for covering with ceiling material to hide it. The lower photo shows the return-air grille in the basement. This grille is connected to the return-air main duct with a 14 x 3 1/4-in. metal duct. With all ducts installed you are ready to wire the furnace blower and oil burner or gas burner. Most manufacturers furnish wiring diagrams for this. If you are unfamiliar with wiring procedures, an electrician should do the job. However, if you do attempt it yourself, have the work inspected by a qualified person. The photo on page 180 pictures how blower speed is determined with two thermometers. This phase plus air-conditioner hookup will be covered next month.

Return-air grille in basement located in wall above baseboard and fed into a duct leading to main duct



Template Aids Placing Pickets In Repeat Design of Fence



When building a picket fence that has a curved top line repeated at regular intervals, a template will assure accurate duplication of the design. The template may be of heavy cardboard or hardboard nailed to a length of 1-in. stock. In use, it is nailed temporarily to the top rail of the fence while the pickets are nailed in place. Picket spacing can be aided by marking the template or nailing wooden blocks to it at the correct intervals.

Clay Shapes Sandpaper To Molding Grooves



The sandpapering of small molding and other irregularly shaped pieces can be done easily if a large lump of modeling clay or putty is pressed against the back of the sandpaper during the operation.

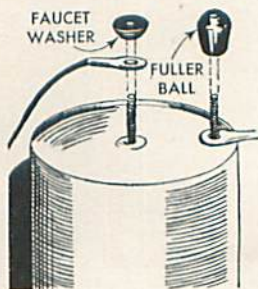
Magic Egg Spins By Itself

At your next party mystify your friends with an egg that will "spin by itself." Spin a fresh egg on a table top, then stop it suddenly by placing one finger on top. Remove the finger as quickly as possible and the egg will slowly spin one or more times. Now, hand a hardboiled egg to a friend and ask him to repeat the stunt. He will find it impossible to do the trick, because the hardboiled egg will act like a solid object. The secret of the trick egg lies in the fact

that the liquid inside a fresh egg retains inertia from the spinning. When the egg is stopped, then released, the liquid imparts the inertia to the shell. As with any illusion, practice will assure a smooth presentation. The eggs should be at room temperature; the liquid in a chilled egg will be too thick to react properly.

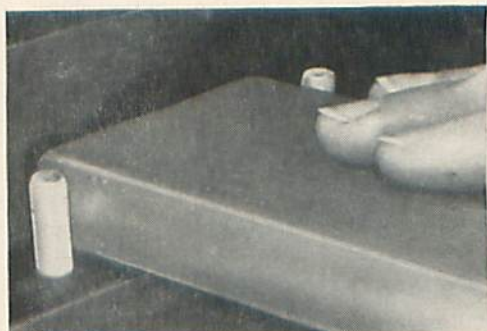
Faucet Washer Replaces Lost Battery Nut

In an emergency, when a nut has been lost from a dry cell, a faucet washer or a fuller ball can be used to replace it. Either can be threaded onto the battery post to hold the wires securely. Since a better contact can be had when a metal nut is used, a standard battery nut should be put on the post as soon as possible.



Bed Slats Held on Side Rail With Dowel-Pin Stops

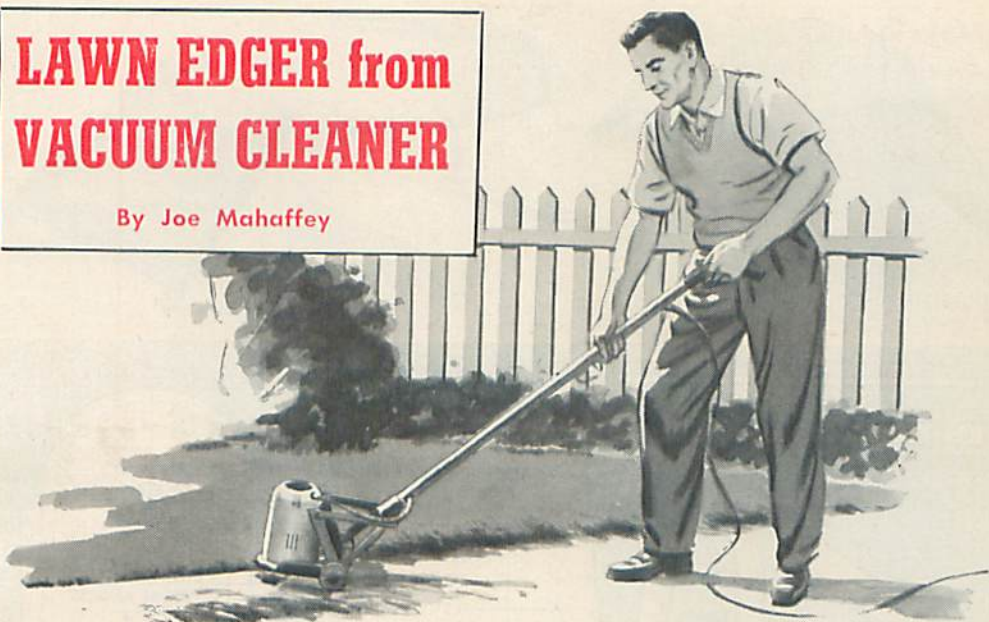
Shifting bed slats that sometimes fall out and drop spring and mattress to the floor can be locked in place by using short lengths of 1/4-in. dowel. Locate each slat in its correct position, then drill a 1/4-in. hole into the side rail on both sides of each end of the slats. Drive a dowel into each hole and the slat cannot move sideways, yet may be lifted easily should the bed ever be disassembled. The dowels should be flush with, or lower than, the top of the slats.—Frank A. Javor, North Bergen, N. J.



Oilcloth used on kitchen shelves will last longer if given a coat or two of linseed oil. When this has dried, give it a coat of varnish. Oilcloth will be soft and durable after treatment.

LAWN EDGER from VACUUM CLEANER

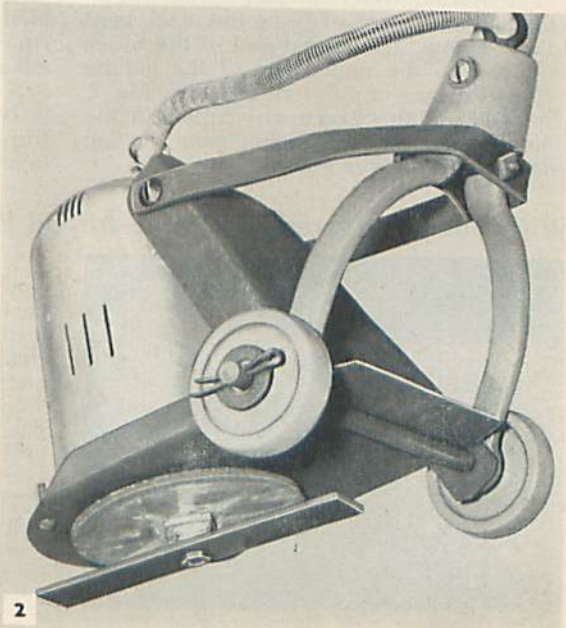
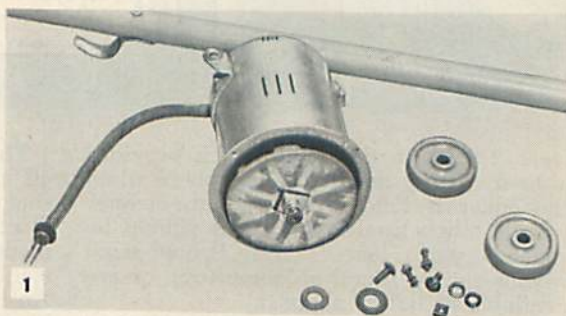
By Joe Mahaffey

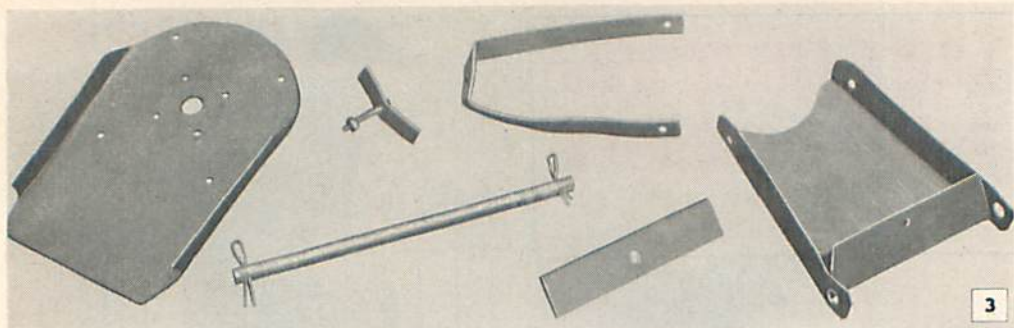


THIS ROTARY-BLADE lawn edger not only eliminates the job of hand-trimming the lawn along sidewalks and curbs, but cuts high grass and weeds under shrubbery and along fences that would be impossible to reach with an ordinary mower. The edger is powered by an electric motor salvaged from an old upright vacuum cleaner that also furnishes the handle and wheels, Fig. 1. With minor changes in the dimensions and bolt-hole locations given in the detail, the motor from any make or model of vacuum cleaner can be used.

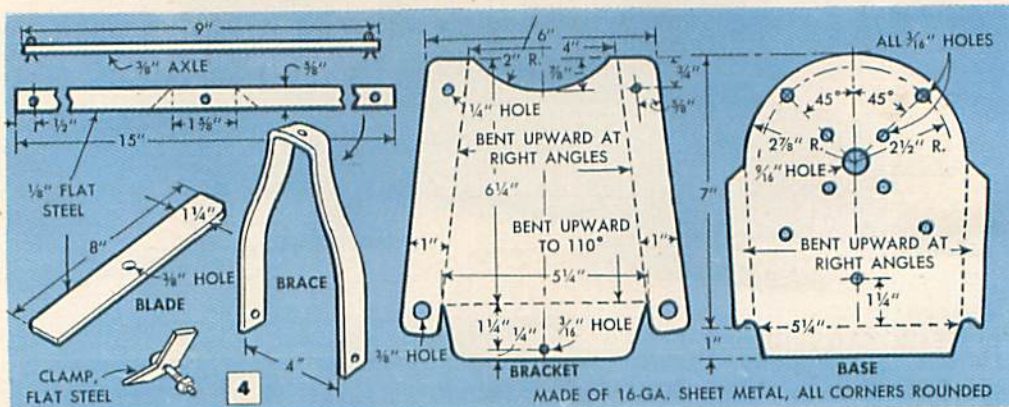
As pictured in Fig. 3, six parts are required to change the vacuum cleaner to a lawn edger: Base, bracket, axle, brace, clamp and cutting blade. The base and bracket are cut and bent from 16-ga. sheet metal, as detailed in Fig. 4. The corners and edges of both base and bracket are rounded and smoothed with a file. The vacuum-cleaner motor is bolted directly to the base, using its flanged housing as a motor mount. The impeller, of course, must be removed to permit the motor shaft to pass through the $\frac{1}{16}$ -in. hole in the base.

The axle, a 9-in. length of $\frac{3}{8}$ -in. steel rod, is fitted on the bracket, and base and bracket are assembled. Wheels on the vacuum cleaner used for the original edger





3



were 2 3/8 in. in diameter which provides a good cutting height for the blade when the edger is held level. Vacuum-cleaner wheels much smaller than this should be replaced with larger ones. Proper-sized wheels can be found on some toys, or are available at hobby shops.

The brace between the handle and bracket is a 15-in. length of 1/8-in. flat steel, bent to a U-shape. The closed end of the brace is bolted to the upper end of the handle yoke by means of a flat-steel clamp, Fig. 2. The ends of the brace are bolted to the flanged sides of the bracket near the top edge with 1/4-in. stove bolts.

The blades of the impeller are hacksawed off and filed down so the impeller disk is smooth. Then the edger blade is bolted directly onto the impeller hub. The edger blade is an 8-in. length of 1/8 x 1 1/4-in. flat steel. It is not sharpened but left square. Any edge which might be ground on the blade would be damaged the first time the blade struck a stone or other solid object. An overload "clutch" is provided by fitting a leather washer on each side of the blade.

As a safety precaution, after the blade is bolted on the shaft, drill a small hole through the nut and shaft and lock them together with a cotter pin. ★ ★ ★

Wire Hooks Soldered on Coffee-Jar Lid Hold Measuring Spoons



Measuring spoons to use when preparing concentrated tea and coffee powders can be kept right with the jars by soldering hooks to the lids. When a new jar is purchased, simply change lids. An alternate method for attaching hooks is to bend a length of wire to fit around the neck of the jar. The ends are allowed to project to provide hooks.—Ed Packer, Oak Park, Ill.

□ The useful life of a sanding disk can be extended if it is cleaned by tapping it with a wire brush while it is rotating. Tapping is more effective than holding the brush against the disk.

Salvaged Airliner Seats Used as Lounge Chairs

Passenger seats salvaged from dismantled commercial airliners are used as comfortable lounge chairs in the den and rumpus room of one home, both in the original pairs and as single units. Aircraft-aluminum frames make the seats lightweight and easy to move when housecleaning or for a better view of a television screen. The seat backs are adjustable to various angles for lounging comfort, and built-in ash trays are always at hand. When the seats are cut apart and used as single chairs, the center arm of the seats is left on one chair and a new arm is made for the other. Snack trays which fit across the arms, similar to the trays used when serv-



ing food aloft in an airliner, can easily be made. The trays would be especially appreciated when watching a football game or other long sporting event on television, when refreshments might be served.

William Brenton Nash, Miami, Fla.

"Wishing Well" Around Cover Provides Cistern Protection

When a truck broke through the wooden cover on a cistern, this homeowner immediately made a 4-in.-thick reinforced-concrete disk to replace it. Besides removing the hazard of the open hole the concrete assures there will be no break-through in the future. To further assure protection

for the cistern cover a "wishing well" was built around it. The circular wall is 10 courses of brick. Two 4 x 4s are fitted inside the wall to hold up the well roof which is made of dimensioned lumber and covered with cedar shingles. A four-section set of sheet-metal trays is planted with flowers and fitted flush with the top of the wall. A length of chain and well bucket add to the picturesque appearance of the well; in reality a motor-driven pump draws water from the cistern.

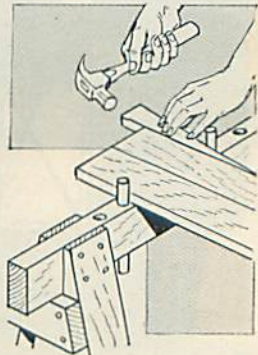
Norman J. Zierold, Iowa City, Iowa.



Ⓒ A quick method of removing stains from copper-bottomed cooking utensils is to use a vinegar-soaked cloth and ordinary table salt. First, rub the moistened cloth over the copper. Next sprinkle salt on the metal and, using the cloth, scour away the stains.

Dowel Stops in Sawhorses Substitute for Clamps

When long clamps are not available and wide boards or frames must be glued together, two sawhorses drilled for dowel stops as shown in the illustration can be used to hold the work. The boards to be edge-glued are placed between the stops. Then a long wooden wedge is driven between one of the dowels and the work to clamp the boards. When not in use, the stops may be driven down.



Flying Saucer AIRBOAT

THE FLYING SAUCER is a fast, inexpensive airboat that will take you into shallow water and marshes, over mud flats and sand bars, and still be safe, seaworthy and easy to handle in deep water. The boat will carry four passengers, or three with hunting or fishing gear and, although not designed primarily for speed, it will outrun most conventional outboard boats. Fitted with a Continental A-65 engine and a Banks-Maxwell 660-36 propeller, the *Flying Saucer* attains a speed of 35 m.p.h. in deep water, with three passengers aboard. Higher speeds are reached

when running over grass or mud which is covered with an inch or so of water.

The hull design permits the boat to plane at minimum speeds. The boat banks nicely on turns, and the use of both an air rudder and a tilting water rudder affords positive control at all speeds. Another feature of the *Flying Saucer* is a safe mesh-covered propeller guard and a crank which is inserted through the guard hub for turning-over the engine.

Unless pre-cut frames are purchased in kit form, the first step in building the airboat is to cut the bottom and deck frames from 1-in. hardwood, Fig. 3. Four rear-deck frames are required. The side frames, also cut from 1-in. hardwood, are all made the same size as in Fig. 2. After the frames have been cut, bevel the bottom of No. 1 frame 10 deg. and the ends 30 deg.; the bottom of No. 2 frame 5 deg. and the ends 2 deg.; and bevel the sides of No. 3 frame 13 deg.

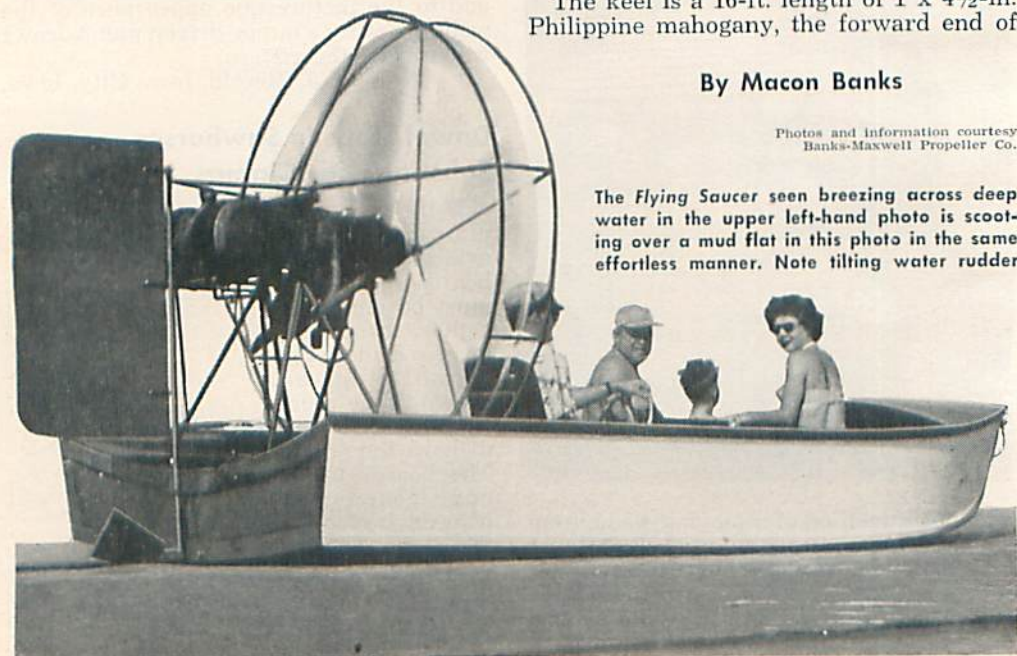
Assemble the frames so the side frames will be in front of the bottom frames and the bevels will face forward when assembled on the keel form. Glue and bolt the side frames to the bottom frames, being sure to leave clearance for the chine notches. Then notch each frame for $\frac{7}{8}$ -in.-sq. mahogany chines, making the cutouts undersize and rasping for a perfect fit.

The keel is a 16-ft. length of 1 x $4\frac{1}{2}$ -in. Philippine mahogany, the forward end of

By Macon Banks

Photos and information courtesy
Banks-Maxwell Propeller Co.

The *Flying Saucer* seen breezing across deep water in the upper left-hand photo is scooting over a mud flat in this photo in the same effortless manner. Note tilting water rudder



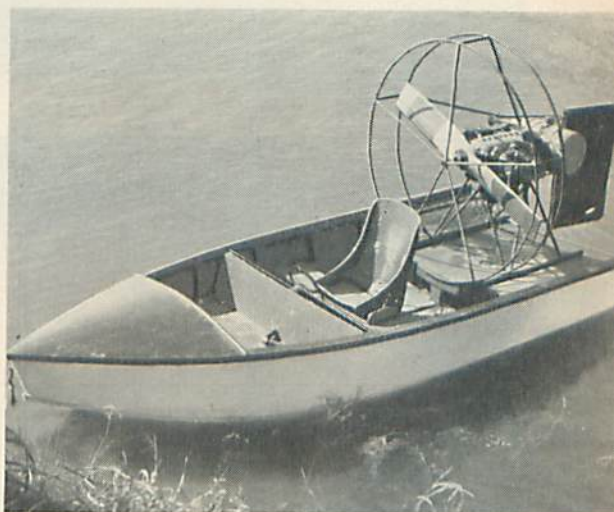
which is cut to match the shape of the stem, Fig. 2. The bottom frames are notched along the centerline to receive the keel. It is best to cut the sides of the notches at 45 deg. so rainwater can flow through the frames toward a drain plug installed in the transom.

A rear-deck frame and frame No. 8 are used as patterns to cut the transom from $\frac{3}{4}$ -in. marine plywood. Notches are made in the transom for the chines and keel. Frame No. 8, two side frames and a rear-deck frame are glued and nailed to the outside of the transom, using galvanized nails driven from both sides.

After the hardwood stem and the keel are fastened together with glue and screws, you are ready for the keel form. The latter is made from 2-in. lumber as in Fig. 2. The form can be nailed to sawhorses or fitted with wooden legs to hold it off the ground.

The frames are now set on the keel form with the side frames facing forward, as mentioned before. Then the keel-and-stem assembly is set in place with the stem nailed temporarily to the front of the keel form. Glue and nail the keel into each frame notch, working from the stem toward the stern. Fit the chines to the stem and keel and tie the chines to frames with strong cord. Then square and align the frames, fit the chines and glue and nail them permanently to the frames. Install the built-up transom next.

Before planking the hull, set nails in the chines about $\frac{3}{16}$ in. below the surface and rasp the edges of the chines so they are parallel with the edges of the side frames. Fit and nail $\frac{3}{8}$ -in.-plywood side planking, applying batten compound where plywood joins transom, chines and stem. Rasp and sand bottom surfaces of the chines flush



This view of *Flying Saucer* shows location of driver's seat with passengers' seat directly in front of it

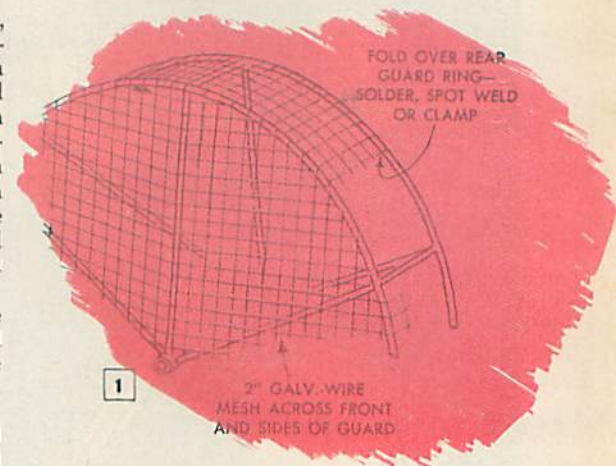
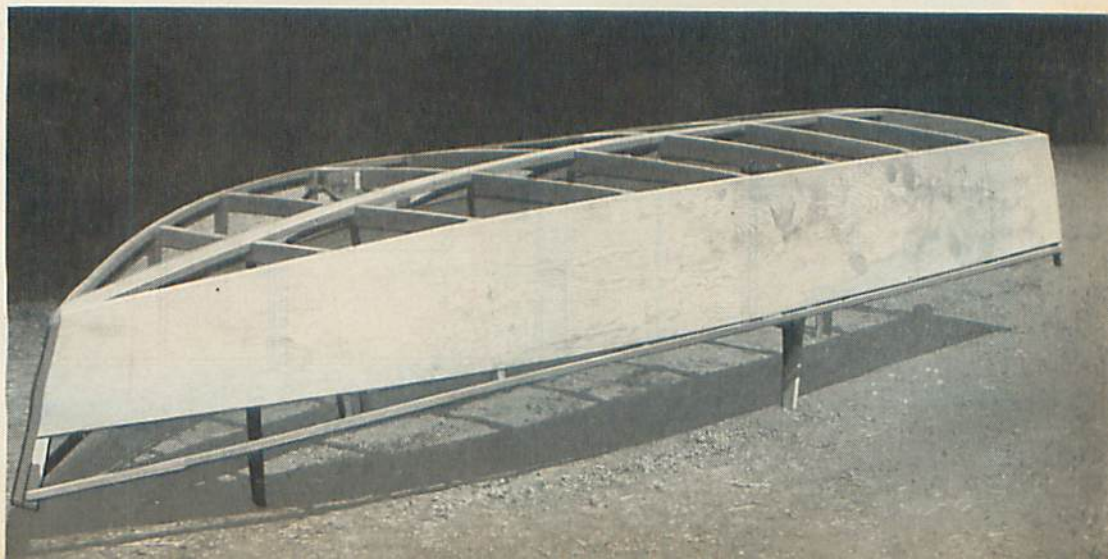


Photo below shows keel and side-planking installation. Note temporary tacking strip nailed along gunwale



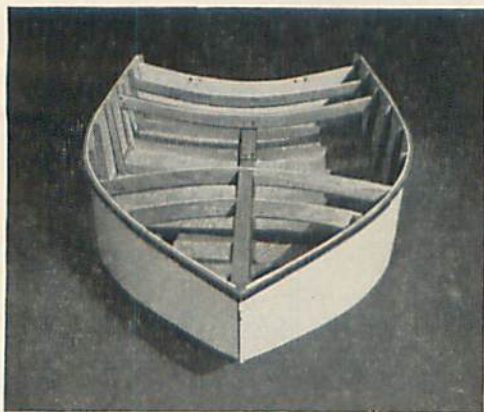
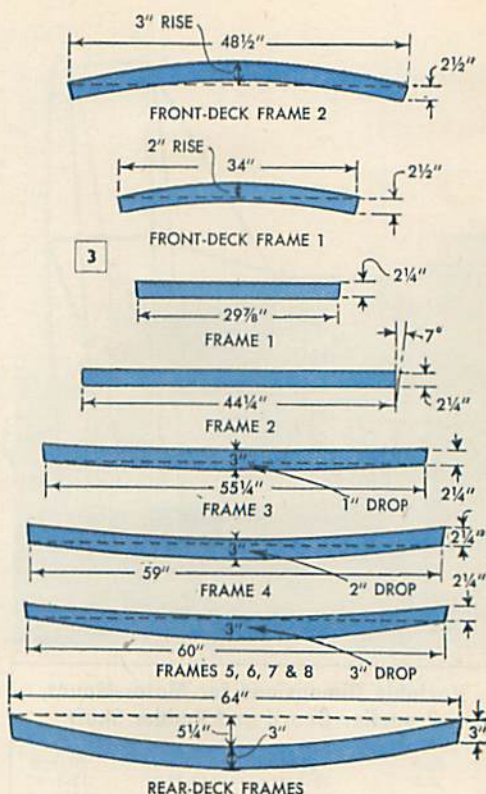
with bottom edges of the frames, trimming the plywood side panels simultaneously. At this time, also bevel the bottom edge of frame No. 3. Next mark the keel centerline and fit two panels of $\frac{3}{8}$ -in. plywood to the bottom, joining them along the centerline. Nail the plywood in place and nail on the outside chine strips.

After removing the hull from the keel form, remove the tack strips from the frames and cut off frames and stem flush with the planking. Install rear-deck frames at the same height as the transom, aligning the frames carefully and bolting in place. Note that the two frames at the forward end of the rear deck are reinforced with a 1 x 5-in. hardwood block bolted to frame No. 6. Motor-mount blocks are fastened to the transom, Fig. 2, and also between the forward rear-deck frames.

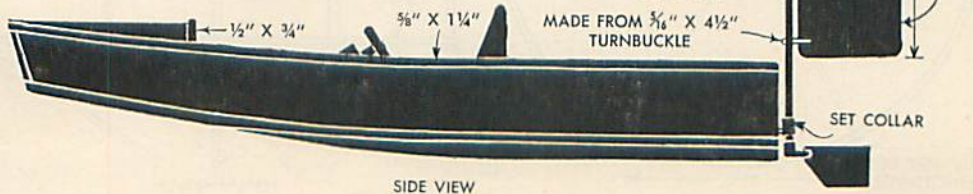
The lower rudder-post bracket consists of two brass pipe flanges bolted together through the transom $4\frac{1}{2}$ in. above the bottom, as in Fig. 4. After installing the bracket, paint the inside of the boat. Next install the front deck frames and cover both of the decks with $\frac{1}{4}$ -in. plywood. Finally, fit the hull with floor boards and seats.

The gunwale is trimmed with $\frac{5}{16}$ x $1\frac{5}{8}$ -in. lattice strips on the inside and the top is covered with $\frac{3}{8}$ -in. strips which are cut from 6-in. stock to follow the hull contour. After adding trim, paint the hull to suit.

The motor mount and the propeller guard are welded from black-iron pipe as in Fig. 5. Note the variable dimensions which are



Center strip of $\frac{3}{4}$ x 2-in. hardwood is set in front-deck-frame notches and faired into stem as above

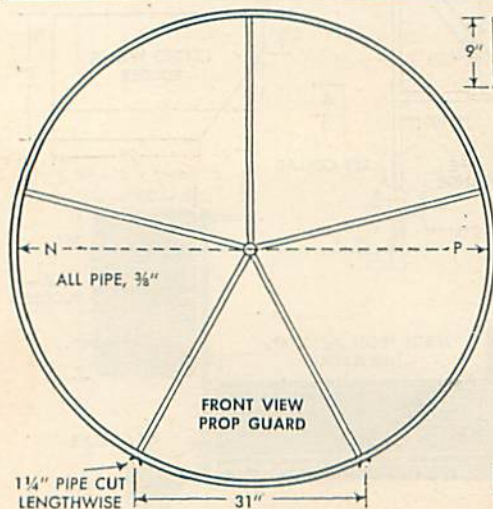




Variable Dimensions for Motor-Mount, Propeller Guard and Rudder Shaft

Part	Propeller Size	50 inch	60 inch	70 inch
A-B	12-1/4"	12-1/4"	12-1/4"	12-1/4"
A-C	14"	14"	14"	14"
A-D	25-5/8"	26-5/8"	26"	26"
A-E	34-3/8"	35-1/2"	38-1/2"	38-1/2"
B-F	20"	24-3/4"	30-3/8"	30-3/8"
C-G	22"	27-5/16"	32-1/2"	32-1/2"
D-G	18-11/16"	24-7/16"	30"	30"
E-H	19-1/2"	25-3/16"	32-1/4"	32-1/4"
J-K	16-1/8"	19-3/4"	22-1/4"	22-1/4"
L-M	26-1/2"	30"	34-1/4"	34-1/4"
N-P	53"	63"	73"	73"
W-X	23"	27-3/8"	31"	31"
Y-Z	25-1/2"	30-1/8"	35-3/8"	35-3/8"
Rudder shaft length		49-1/4"	54-1/4"	59-1/4"

Note: The above dimensions are for use with Continental engines A-50, 65, 75, 80 and C-75, 85, 90

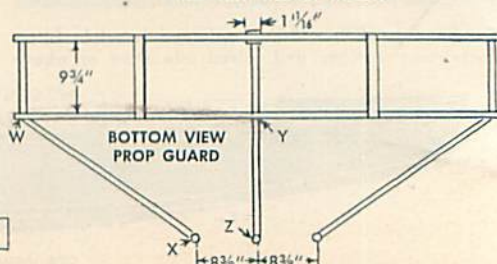
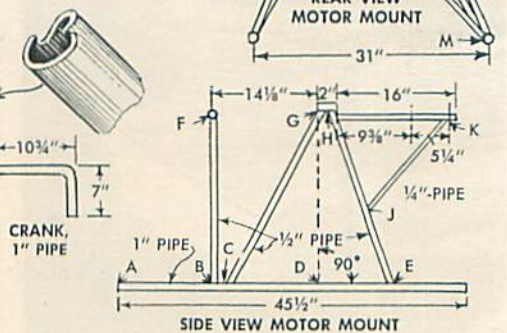
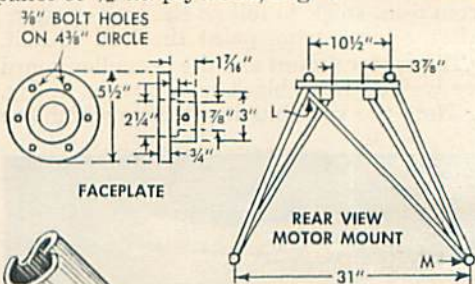


determined by the motor and propeller selected, as indicated in the table along with Fig. 5. Install the engine temporarily on the mount, supporting it from above, and level it both ways before welding brace, L-M, and the front supports, B-F.

The propeller guard rests on two 11-in.-long pieces of 1 1/4-in. pipe which are cut lengthwise. These fit over the motor-mount base pieces and, on assembly, are bolted through them and the deck. A piece of 1 1/2 x 18-in. steel angle is bolted across the top of the engine for fastening the propeller-guard braces and rudder bracket.

The propeller faceplate is machined from an aluminum casting and fitted with a crosspin to engage a crank handle, Fig. 5. The propeller guard should be temporarily installed to align the 1 1/4-in.-pipe hub with the propeller faceplate, cutting and welding the spider framework at this time. The guard is covered with wire mesh, Fig. 1.

Make the rudder post from 1/2-in. pipe as in Fig. 4. The tilting water rudder is cut from 1/8-in. black iron and pinned or bolted in a yoke made from half a turnbuckle which is welded to the post. The rudder should be free to tilt upward, but fitted with a pin to keep it from dropping below the horizontal. The air rudder is a panel of 1/2-in. plywood, Fig. 4. ★ ★ ★



5



Compartmentalization effect has been created here through the use of a floor-to-ceiling bamboo curtain

Bathroom Glamour

Careful planning and colorful fixtures and walls can make a bathroom as modern as any room in the house

By William E. Kramer

Plumbing and Heating Industries Bureau

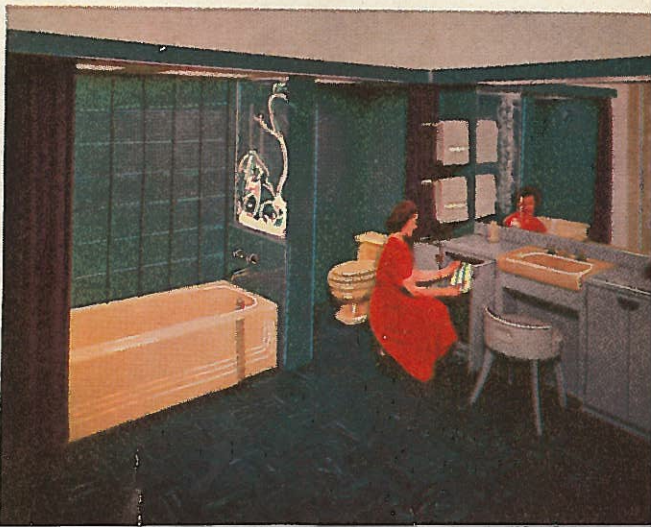
WHEN IT COMES to remodeling, the bathroom is usually the most overlooked room in the house. In many homes, at remodeling time, the bathroom just gets another coat of paint. But the fact is that paint cannot cover up worn, outdated fixtures, cracked tile or warped baseboards.

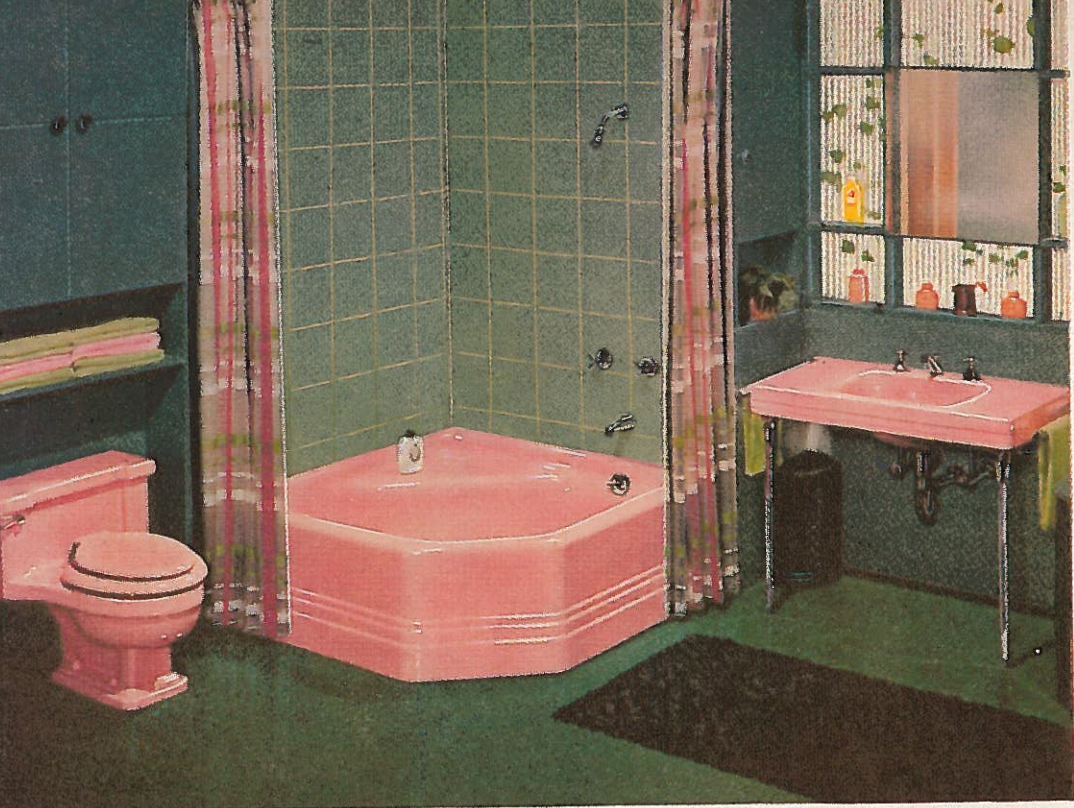
Rejuvenating a bathroom isn't

The modern vanity-lavatory is favored by women for extra convenience and beauty

MAY 1955

195





Bathtubs are available in many shapes and sizes to solve space problems. Square tub is only 4 ft. long

as difficult or as expensive as you think. In most cases, the necessary piping is already in. This means that most of the cost will lie in decoration, new accessories and replacement of fixtures.

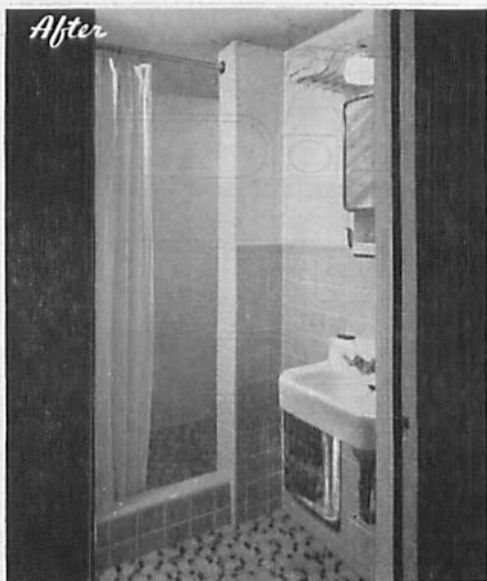
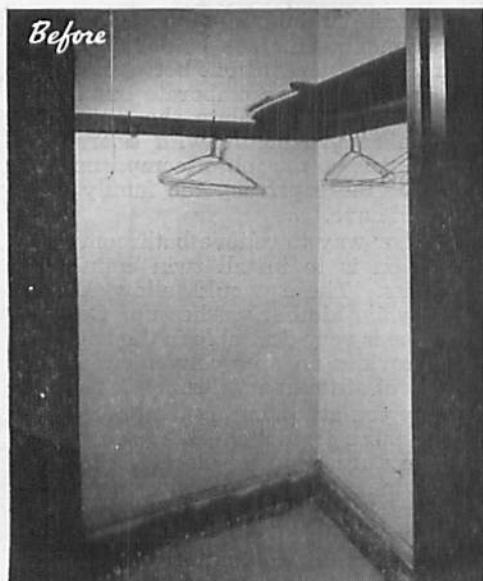
Before making definite plans, take time to examine the bathroom critically. Has it ever occurred to you that perhaps the bathroom may not be as efficient as it should be? Old-fashioned bathroom arrangements

were not always made with an eye to maximum convenience.

Where possible, it's a good idea to consider installing a powder room in addition to modernizing the present bathroom. Most older two-story homes have only one bath—upstairs. This means tiresome stair-climbing. Thousands of owners, weary of this, have eliminated this inconvenience by installing a new bath or powder room on

The wide range of colors available in fixtures permits an almost unlimited selection of color schemes





These before-and-after photos show how two clothes closets, back to back, were utilized to provide room for this compact bathroom. Shower stall was used instead of tub. Exhaust fan can be used to ventilate room

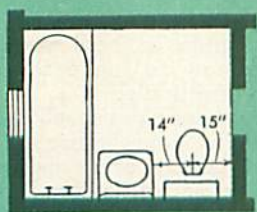
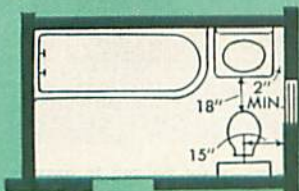
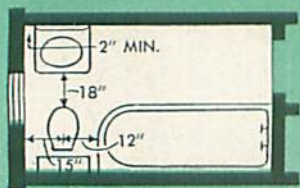
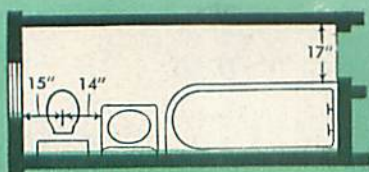
the first floor. On the other hand, if the budget can't afford a brand-new bath right now, miracles can be accomplished by modernizing the old one. Partitioning and a simple rearrangement may solve the problem. Or perhaps what you need is to add another fixture. Space is seldom a problem in bathroom rearrangement. Many older homes suffer from bathrooms which already are oversized, and these, in most

cases, are the ones that most desperately need remodeling. In these cases, the main problem is how to make the bathroom serve more effectively.

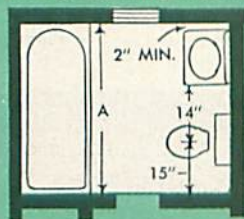
This extra space can be well used in compartmentalizing your bathroom. Dividing the bath into several areas makes it appear cozier and more attractive. Most important, it permits several members of the family to use the facilities at the same time

Another before-and-after example of how dated bathroom can be glamorized with wallpaper and plastic tile and addition of a vanity lavatory. Note fluorescent light in soffit over lavatory and planter across the back

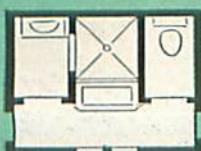
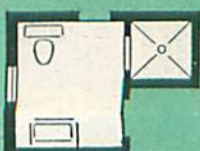
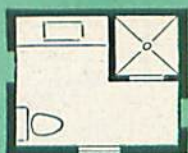




A—5'-0" MIN. RECOMMENDED BETWEEN STUDS



FIVE TYPICAL TUB ARRANGEMENTS



FOUR TYPICAL SHOWER-STALL LAYOUTS

with at least a minimum of privacy. Simple compartmentalizing can be done by erecting inexpensive partitions between the fixture areas. A more elaborate installation would completely isolate the fixtures in separate compartments with doors. The more extensive the job of compartmentalizing, the more privacy the family members will have.

Another way to relieve bathroom traffic congestion is to install twin counter-top lavatories. These would allow Dad to shave while Mother washes up. Counter-top space is very desirable in the bathroom as it provides an area convenient for the placement of toilet articles.

While you are planning the bathroom to handle more traffic, check to see if some of the fixtures can be relocated. In many homes, the bathtub is directly beneath the window. Usually this means that the tub is cold and drafty during the winter. If the arrangement of your bathroom won't permit moving the tub to a new location, it might be a good idea to brick up the window with glass block. This will eliminate drafts, and at the same time add a modern appearance. Some manufacturers state that it is seldom necessary to ventilate a windowless bathroom unless it gets more-than-average use or where the climate is very humid. Where ventilation is necessary after putting in glass block, a regular ventilating fan should be installed.

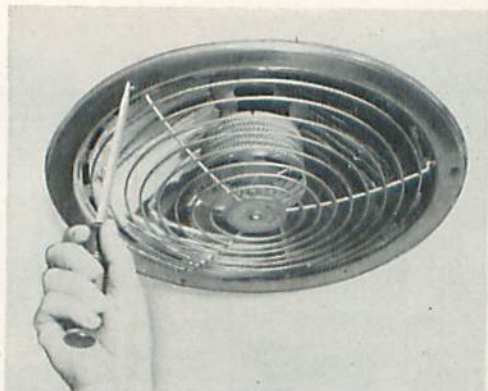
If your bathroom is more than 10 years old, you will be in for quite a surprise when it comes to picking out new fixtures. There have been remarkable improve-

Roomy bathroom may permit installation of linen closet. This one has sliding trays instead of shelves

Courtesy Holcomb & Hoke Mfg. Co., Inc.



POPULAR MECHANICS



Courtesy Nutone, Inc.

This 1000-watt radiant heater, which is easily mounted between ceiling joists, has fan-type cooling system

ments in plumbing fixtures over the past few years. Toilets, for example, are now available in one-piece styles with virtually silent flushing actions. Another innovation has been the introduction of nonsweating tanks by several manufacturers. These tanks are insulated so that during warm, humid weather moisture does not accumulate on the outside of the tank. Vanity lavatories have become a most popular fixture among women. They offer all the advantages of a vanity dresser, including a wide expanse of mirror and counter top with drawer space below, plus the lavatory itself.

As for bathtubs, they are available in all shapes and sizes. A standard tub is 5 ft. long and about 29 to 32 in. wide. However, if your quarters are cramped, you can use a 4½-ft. tub or a shower-receptor-and-bathtub combination, which comes 3½ ft. long or less. If the bathroom is long and narrow, a square bathtub at one end may be the answer. These are only 4 ft. long, but are considerably wider than the average bathtub. The bathing area is cast on the diagonal with practically no loss of "soaking space" over the standard 5-ft. tub. The wide variety of sizes and shapes of today's fixtures assures you of one that will fit into your new bathroom floor plan.

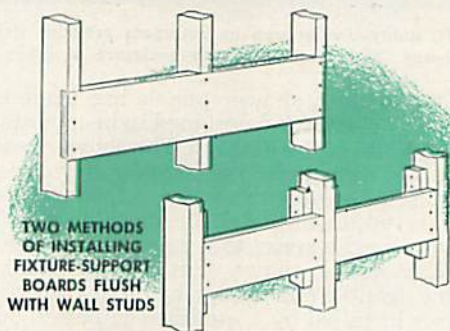
Just as numerous fixture designs give you a wide range of floor plans, the many pleasantly matched colors available in fixtures permit almost unlimited selection of color schemes. Pastel shades are most popular because they lend themselves to more varied color combinations. In addition to white, fixtures may now be purchased in pink, green, tan, gray, maroon, yellow, blue and many other colors.

Showers also have been brought up to

Right, two typical matching units the handy homeowner can build—lavatory enclosure for hiding cleaning essentials and sliding-door wall cabinet



Above, installation of radiant-type ceiling heater provides quick, safe auxiliary heat to remove chill from bathroom during cool spring and fall mornings



Above, when lavatory is relocated, new hanging supports must be provided by cutting openings in the wall and nailing boards to studs in the manner shown

Courtesy Crane Co.





Courtesy Crane Co.

Left, utility divider-wall in bathroom provides storage space for towels and lotions and also gives partial privacy. Right, attractive tub enclosure of glass fiber serves dual purpose. Note storage-soffit over tub

date. Modern shower panels are made of glass or plastic and designed to be mounted on the rim of the bathtub. The shower head has also come in for redesigning. New types are self-cleaning, and are adjustable by finger-tip touch to deliver anything from a sharp-needle spray to a drenching torrent.

Experience shows that you will save time, trouble and money by having the fixtures installed by a qualified plumber, but the rest of the work can be done by any handy homeowner. Manufacturers have made the job of tiling, both floor and wall, ridiculously simple. There are new pre-pasted papers that actually make wall-papering fun. Room-divider walls that provide both storage and privacy, as well

as partial tub enclosures of glass fiber, are comparatively easy construction jobs that the more experienced week-end carpenter can tackle. The addition of a radiant heater, and a ventilating fan, are worthwhile investments that are easy to install and popular "luxury" items that will make your bathroom a truly modern one. The home-workshop man can make his own "his and hers" medicine cabinet. He can put the waste space under a lavatory to good use by installing a storage cabinet under it to care for cleaning brushes, scouring powders and other items. These suggestions are but a few that will help you build glamour into your dated bathroom and extra value into your home. ★ ★ ★

Iron Removes Paper-Clip Marks From Papers and Photographs



Indentations left on papers or photographs held together with paper clips can be removed by using water and a warm electric iron. First, moisten the area of the indentation by gently wiping a damp sponge over the spot. In the case of a photograph, moisten the back. Now, place an iron, adjusted to rayon or silk heat, over the moistened area and hold for just a moment, or until the moisture has evaporated. The paper will be smooth with no indication of the paper-clip mark.

☛ To keep the address legible on a package that is to be mailed, put a strip of cellophane tape over it. It is a good idea to protect the labels on medicine bottles in the same manner.

Nonslip Feet for Oilstone Cut From Rubber Hose



Short pieces of heavy rubber hose can be slit lengthwise and slipped over the ends of an oilstone, as shown, to provide nonslip feet. If cut a little longer than the width of the stone, the feet also serve as protective

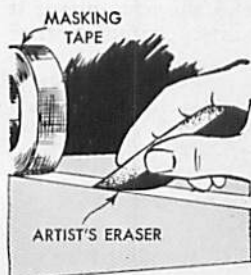
bumpers that prevent chipping or breaking of the stone if it should be dropped accidentally.

Ice Glaze on Frozen Fish Seals in Flavor

Freshly caught fish that are quick-frozen will retain their flavor and moisture much longer if they are glazed with ice to provide an airtight covering. Clean the fish in the usual way and place them in the freezer with each fish wrapped in wax paper so they will freeze separately. When they have frozen solidly, remove wax paper, dip each fish into cold water and return to the freezer. Repeat this process two or three times until each fish is coated with fine glaze of ice.

George C. Mattis, Birchwood, Wis.

Eraser Seals Masking-Tape Edges



Paint won't seep under the edges of masking tape used to make a stop line if they are first sealed with an artist's rubber eraser. After the tape has been placed around the work to be painted, the eraser is drawn

along the edges that will contact the paint. The application of only moderate pressure on the eraser will seal the edges completely.

Hit the Road . . .

with a boat trailer. Make a variety of waters the spice of your boating for the whole family this summer. A trailer brings your favorite lakes and rivers within easy week-end reach of your outboard boat. A feature story next month explains why thousands of boaters are enthusiastic about the trailer, and tells how to select and operate it as well as handle it on the road



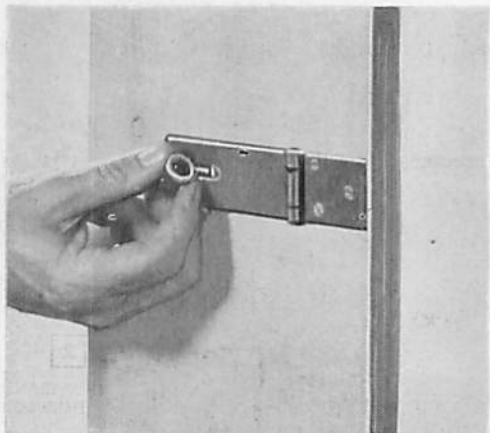
"Kinkproof" Unwinding of Wire

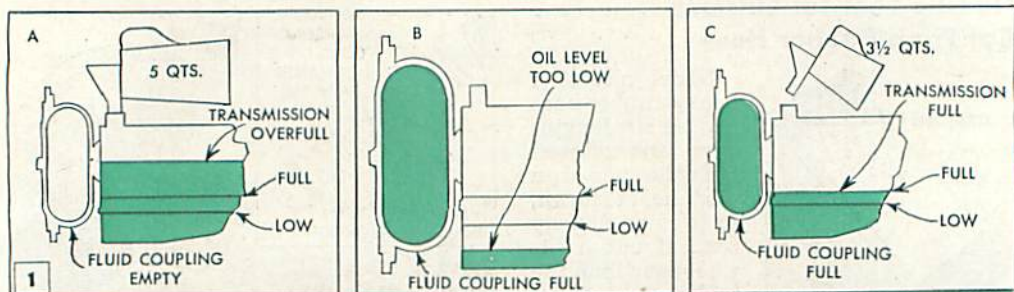
To unwind a roll of wire without kinking or twisting it, start feeding the wire from the outside of the roll and unloop a given number of turns as you walk with it. Next, turn the roll 180 deg. and unroll an equal number of turns. Repeat the process until the whole roll is unwound. It then will be found that the equal number of right-hand and left-hand twists will cancel each other and result in a twist-free length of wire.

Nil Brown, Hunter, Okla.

Screw Eye Holds Back Hasp When Not Closed

When a padlock hasp is not being used, hold it flat against a door with a turn button fitted through the staple slot so it will not damage the door casing or snag the clothing of anyone entering the door. The turn button is simply a large screw eye driven into the door at the proper location.





Servicing **AUTOMATIC TRANSMISSIONS**

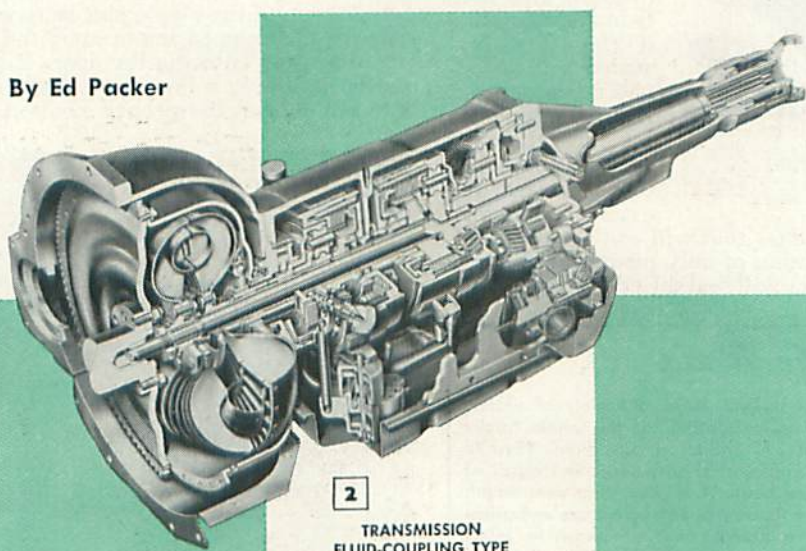
OIL IN THE automatic transmission of your car not only transmits power to drive the car, it also lubricates moving parts, dissipates heat, acts as a cleaning agent and provides power for actuating the mechanism through hydraulic action. That adds up to five jobs in all.

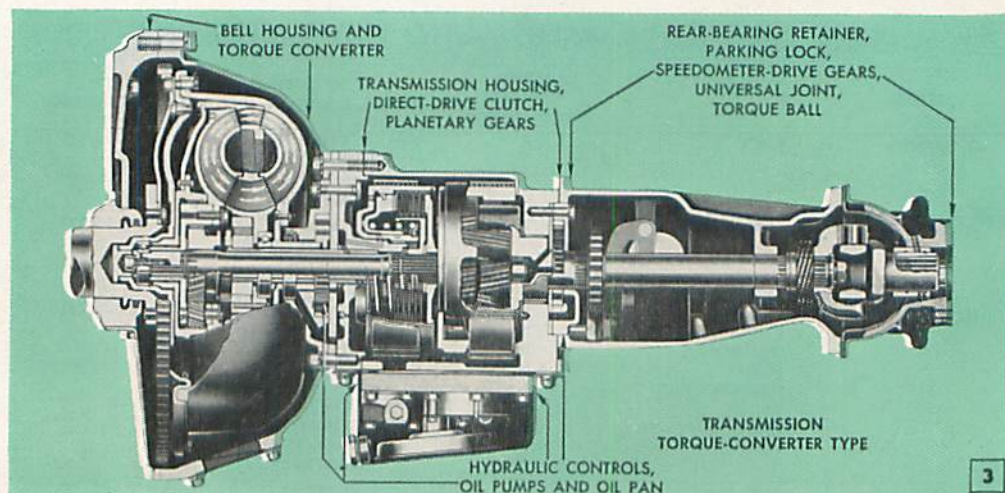
All automatic transmissions are designed to use the same kind of oil. Each container is plainly marked so that it is impossible to mistake this special oil for ordinary lubricant. Although there are certain procedures in servicing which are common to all automatic transmissions, there are variations in location of the filler tubes and in the recommendations covering the length of time or mileage between serv- ings. Note these variations in the table,

Fig. 10. The data given are not necessarily complete as manufacturers often make changes during the model year.

Transmissions in common use are of two types, those employing a fluid coupling, Fig. 2, and those using a torque converter, Fig. 3, to transmit power from the engine. Generally the instructions for checking the oil level in both types of transmissions will be quite specific. Take, for example, the Dynaflo, which is a torque-converter type. Before removing the dipstick you will be instructed to idle the engine with the selector lever in the parking (P) position until the engine reaches operating temperature. Then, with the engine still running, clean the filler neck and the area about it thoroughly to remove any accumulation of

By Ed Packer

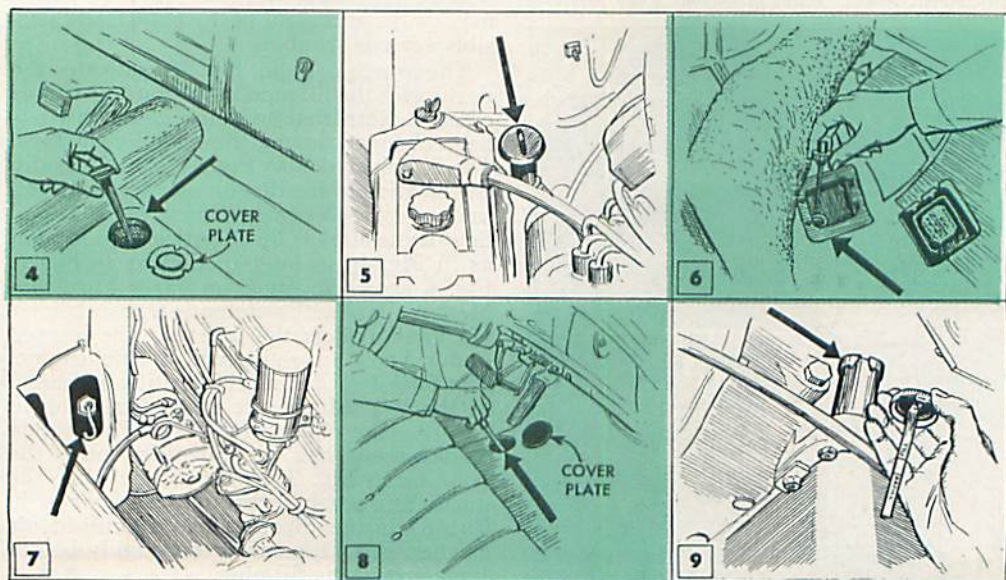




oil, grit and mud. This is important, as any small particles that chance to enter the transmission through the filler neck when the dipstick is removed may cause serious trouble later on. Because of this possibility this precaution should be carefully observed each time the dipstick is removed. On the other hand, instructions applying to the Fordomatic and Merc-O-Matic transmissions, which also are of the torque-converter type, direct you to place the selector lever in neutral (N) position and idle the engine for approximately four minutes. Then, with the engine still running, move the selector lever through all speed ranges and leave in the parking (P) position. Finally, with the engine running, remove the dipstick, check the reading

and add oil if needed. Again the instructions vary when applied to the fluid-coupling transmission, of which the Hydra-Matic is typical. The selector lever is placed in neutral (N) and the engine is run for 1½ minutes at a speed equivalent to 20 miles per hour. Then it is throttled to a slow idle while the oil level in the transmission is checked. These variations make it important to know the correct procedure for each make of car and transmission, as manufacturers' instructions may vary.

Why these procedures are important is shown in Fig. 1, details A, B and C. For purposes of illustration we can assume that oil is added with the transmission at rest as in detail A. When the engine is



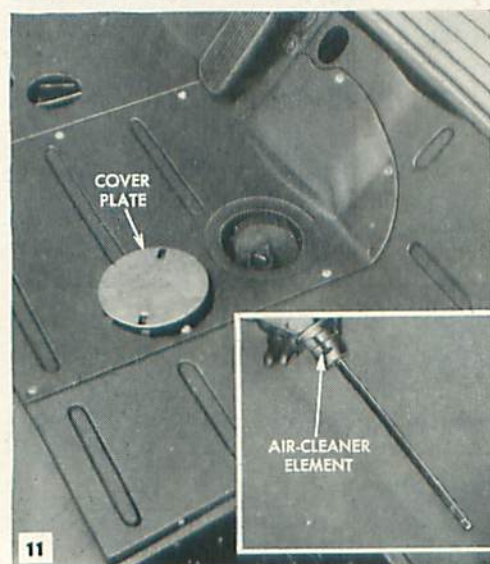
SERVICING DATA-AUTOMATIC TRANSMISSIONS

TRANS.	MAKE CAR	LEVER POSITION (engine running)	FILL-PIPE LOCATION	REFILL AT (MILES)
DYNAFLOW	BUICK	P	1948-1949 BENEATH FLOOR Late 1949-1954 UNDER HOOD	25,000
FORDOMATIC	FORD	P	1951-1952 BENEATH FLOOR 1954 UNDER HOOD	15,000
HYDRA-MATIC	CADILLAC	N	CADILLAC 1952-1954	25,000
	LINCOLN	N	UNDER HOOD	
	OLDSMOBILE	N	LINCOLN late 1952-1954	
	FRAZER	N	UNDER HOOD	
	HUDSON	N	OLDS late 1951-1954	
	KAISER	N	UNDER HOOD	
	NASH WILLYS	N	FRAZER, HUDSON, KAISER NASH, WILLYS UNDER FLOOR PAN	
POWERGLIDE	CHEVROLET	N	UNDER HOOD	25,000
POWERFLITE	CHRYSLER	N	UNDER HOOD (all 1954 models)	20,000
	DE SOTO	N		
	DODGE	N		
	PLYMOUTH	N		
MERC-O-MATIC	MERCURY	P	1951-1952 UNDER FLOOR PAN 1953 UNDER HOOD	15,000
STUDEBAKER AUTOMATIC	STUDEBAKER	L	UNDER FLOOR PAN	15,000
ULTRAMATIC	PACKARD	N*	BENEATH CAR	25,000

*Engine not running

Servicing data given in the table above is not necessarily all-inclusive. Manufacturers frequently make changes in instructions and specifications during model years. Note also that there is considerable variation in recommended mileage between refills

Some dipsticks on transmissions are fitted with an air-cleaner. Always clean in solvent when servicing

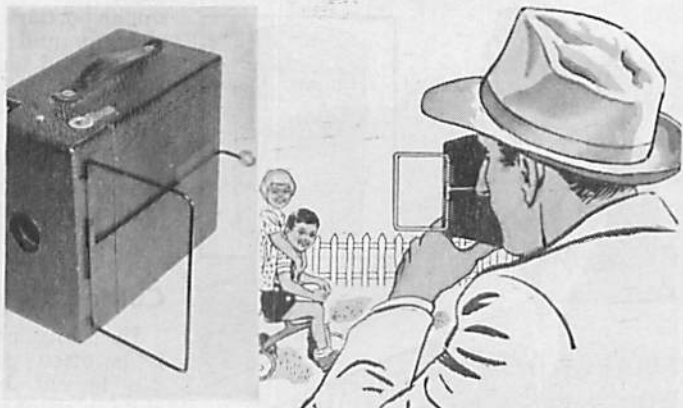


started, a portion of the oil will be pumped into the coupling, leaving the oil level in the transmission low, detail B. If another check is made at this time it will show that more oil must be added, detail C, in order to bring the oil to the correct level. If oil is not added as indicated, the transmission will be operating with the oil low, which may cause uncertain performance and possibly serious trouble.

The fourth column, Fig. 10, indicates the position of the fill pipe in the various makes of cars. Note that in some cases this has been changed during the model year. Figs. 4 to 9 inclusive, also Fig. 11, show visually the location of the dipstick on several well-known cars. On early Buicks with Dynaflo transmission the dipstick was located as in Fig. 4; on later models as in Fig. 5. Fig. 6 shows dipstick on early Ford and Mercury cars with automatic transmissions. On later models the dipstick was located under hood on right side of the engine. The Packard Ultramatic dipstick is located at the left side of the transmission as in Fig. 9. The Chevrolet with Powerglide transmission has the dipstick under the hood as in Fig. 7. In the Studebaker the dipstick is reached through the floor as in Fig. 8. If the dipstick has a built-in air cleaner, Fig. 11, clean it thoroughly before replacing in the fill pipe. ★ ★ ★

View Finder Made From Wire Allows Panning for Action Shots

Overcoming the problem of limited field of vision through the usual view finder, a sports-type finder made from coat-hanger wire will permit panning for action shots with a simple box camera. The wire is bent in a rectangular or square shape to form the finder, which should be slightly larger than the picture size. To determine the picture size, remove the back of the camera, set the shutter on "time" and place a piece of wax paper over the opening. The square or rectangle of light projected through the lens onto the wax paper is the size of the picture. A small washer is soldered to the short arm of an L-shaped extension to provide a rear sight.

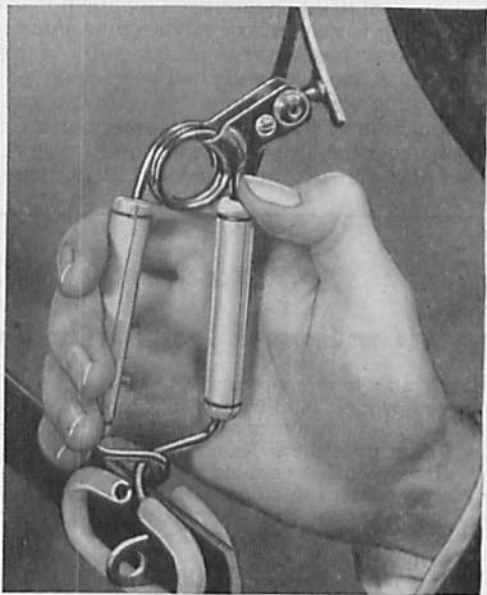


The finder is simply taped to the side of the camera so it can be removed quickly or folded flat against the side when the camera is stored.

John J. Rea, Urbana, Ill.

Grips on Photo-Reflector Clamp Permit Easier Operation

Wooden grips fitted over the wire handles of a photoflood-reflector clamp will make it more comfortable to grip and easier to release. The grips are made by drilling a hole slightly larger than the clamp-wire diameter in two lengths of $\frac{1}{2}$ or $\frac{5}{8}$ -in. dowel. A small groove is cut around the ends of the dowels and they are cut in half lengthwise with a hacksaw or other thin-bladed saw. The halves are cemented over the handles and held in place with fine wire wrapped in the grooves.



"Portable" Mark for Dividers Is Sheet-Metal Strip

Since it is difficult to force a compass or divider point into the surface of heavy sheet metal when scribing circles, one tinsmith uses a small strip of metal in which a hole is already punched to receive the divider point. The



strip is placed in the desired location, then held down by a small magnet. A number of the strips are used, each one having a hole of a different size to accommodate various dividers. The magnet must be strong enough to hold the strip firmly.

Alcohol Removes Grass Stains

• Rubbing alcohol can be used to remove grass stains from clothing. It can be used safely on cotton and colorfast materials, but it is always better to test a sample of the material before attempting to use any solvent. If the material tests out properly, rub the alcohol well into the grass stain until it is removed. Then wash the garment in the usual way.

Blanche Campbell, Los Angeles, Calif.

Basement-Window Wells Replaced By Using Oil-Drum Halves



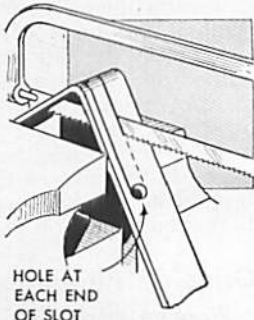
Large oil drums were used by one homeowner to provide inexpensive replacements when new basement-window wells were needed. After both ends had been removed the drums were cut in half lengthwise and the cut edges notched so the lower portions could be bent into flanges to rest against the exterior of the basement wall. The

upper portions of the drum edges were left straight and fitted inside the window frames and fastened with lag screws. For larger windows, the drums could be cut to utilize more than half the circumference. Also, flanges could be bent the full length of both edges to permit bolting or lag-screwing them to the outside surface of the basement wall.

R. S. Howard, Milton, Wis.

Cutting Slots in Sheet Metal

In many cases it is often possible to cut blind slots in sheet metal with a hacksaw. If the metal can stand some bending, the piece to be cut is bent as shown, and clamped firmly in a vise. Then two cuts, one on either side of the slot, are made with the saw. The waste portion is freed by drilling at each end of the slot with a bit having a diameter equal to the width of the slot. This method is much faster than drilling and filing.



Howard E. Moody, Upper Jay, N. Y.

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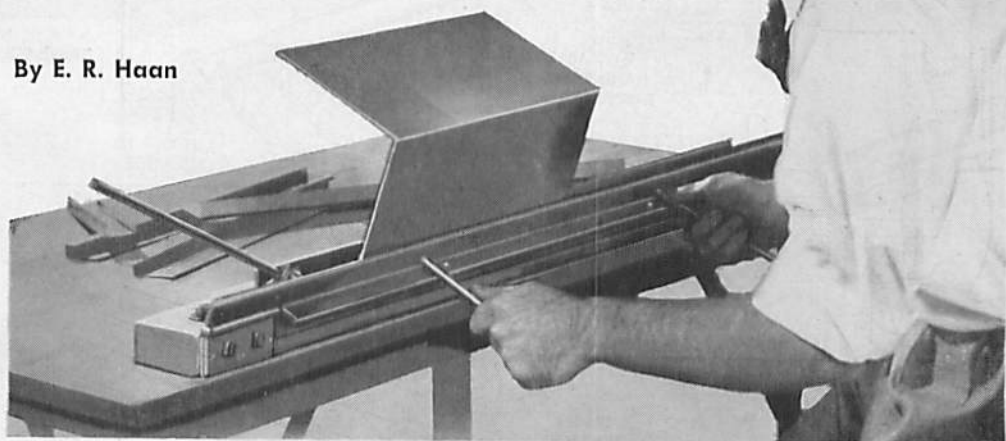


SHOP NOTES

SHEET-METAL BRAKE

for small shops

By E. R. Haan

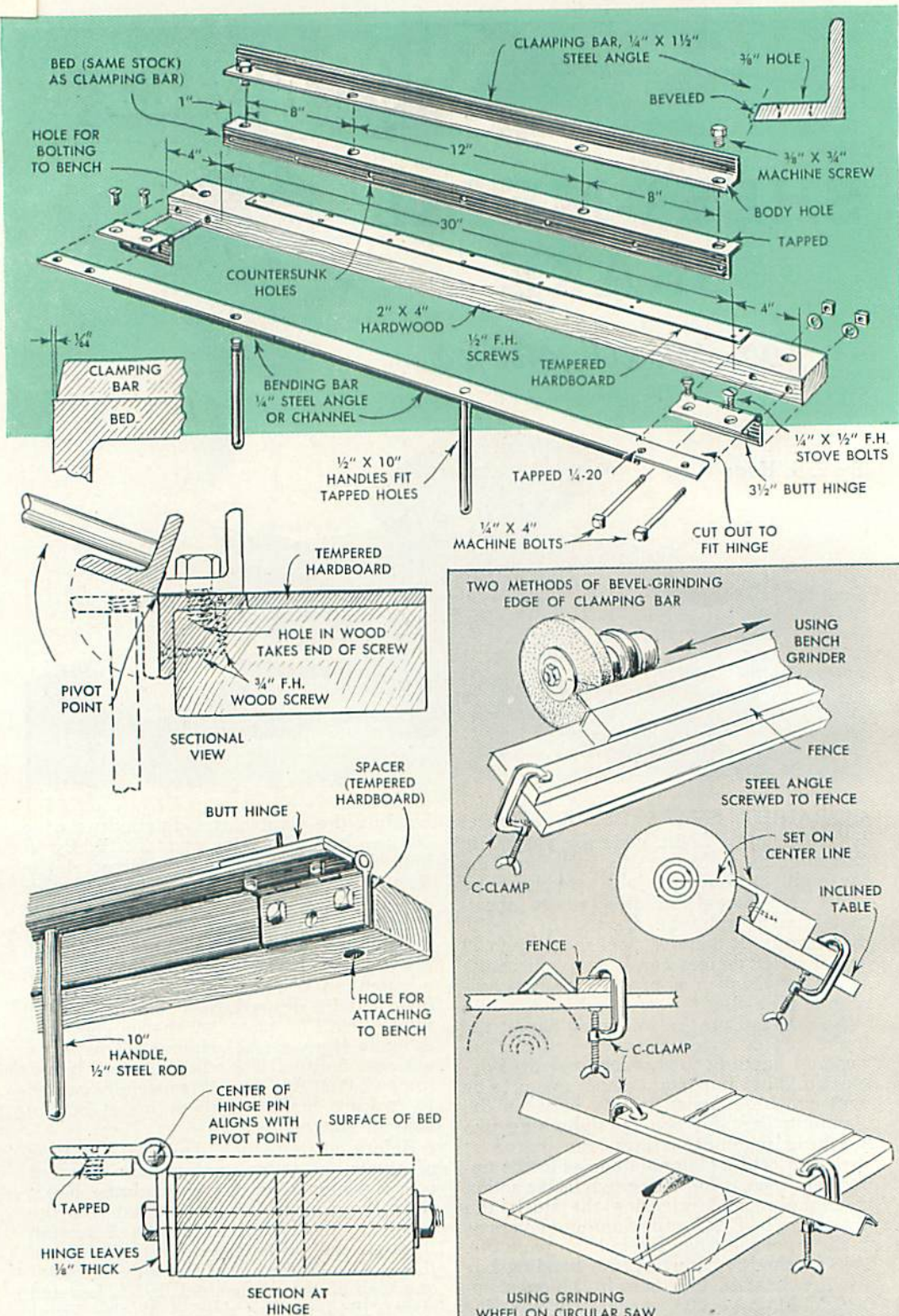


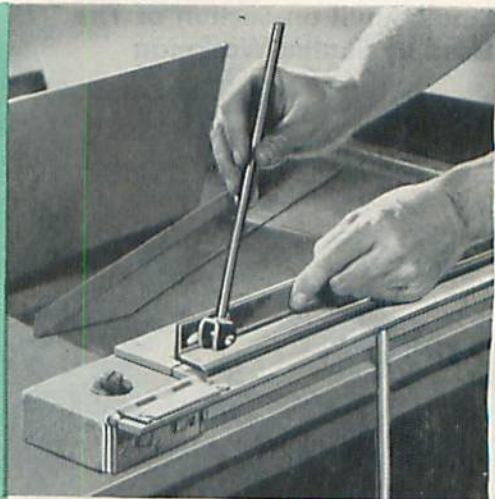
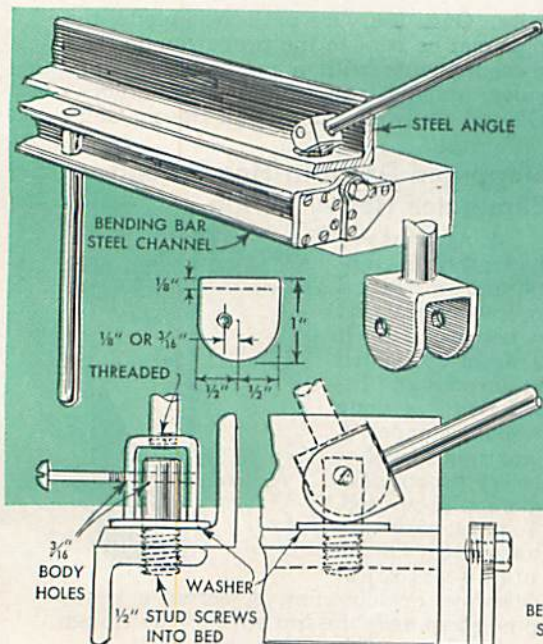
STRAIGHT, SHARP BENDS in sheet metal up to 28 in. wide are easy with this shop-made brake. It's just the thing for light production jobs, experimental work and model building where sheet-metal parts must be formed to precise dimensions. It handles steel sheet up to 20 ga. Heavier gauges can be worked in the softer metals such as brass, copper, aluminum and pewter.

As detailed on the following pages, the brake can be made in two types. For occasional bending jobs where speed of operation is not important, sheet metal to be bent can be clamped tightly between the clamping bar and bed by tightening two hex-head machine screws, one placed at each end of the clamping bar as in the upper detail, page 208. For much faster action in clamping and releasing the stock, the brake can be fitted with camming levers as in the upper left-hand details on page 209. Two methods of hinging the bending bar also are detailed. Ordinary butt hinges, upper detail, page 208, serve very well for average to light work, but for heavier

bending the pivot plates detailed on page 209 are best. The pins must fit tightly in both the butt hinges and the pivot plates. Peen the pins until the hinge leaves offer considerable resistance to movement. The completed brake of the type having camming levers is shown in operation in the photo above. It is designed for attaching to a bench top, but also can be mounted on a floor stand if desired. Note also that in the upper detail on page 209 the bending bar is made from a steel channel. This is an optional feature. The channel-steel bar is somewhat stiffer and is especially suited to making bends in sheet metal of the heavier gauges.

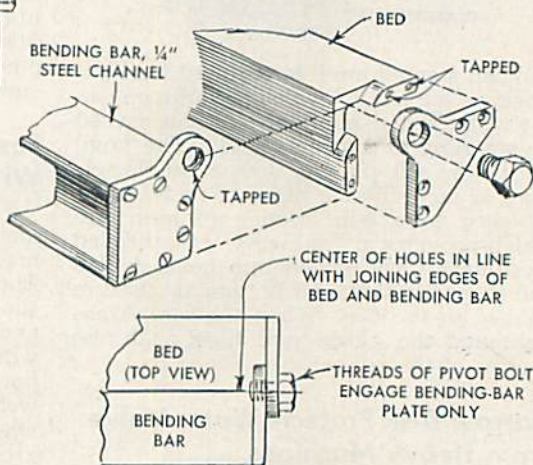
Before cutting stock, decide which type of pivots are to be used for the bending bar, the hinges or the pivot plates. Next, note the center left-hand detail on the following page which shows a section through the parts after assembly. From this it will be seen that the outer edge of one web of the angle-steel bed is beveled about 10 deg. The details at the lower right, page 208, show several methods of





grinding the bevel accurately. Note also from the center detail already referred to that the pivot point of the bending bar must be precisely on the outer corner. This must be kept in mind when locating either the hinges or the pivot plates.

When machine screws are to be used for clamping, lay out and drill the body holes in the clamping bar and then use it as a jig for locating and drilling the tap holes in the bed. Proceed in the same way when the camming levers are to be used to actuate the clamping bar. Then work up the bending bar, using either steel angle or a steel channel. Notch for the butt hinges or the pivot plates, whichever type will be used. Rough-cut the notches with the hacksaw, then file to fit each hinge. Special care must be taken in locating the hinges so that when the parts are assembled the bending bar will have a uniform clearance along the bed. When using an angle-steel bending bar and butt hinges be sure that they will permit the bending bar to swing past the 90-deg. position as in the center sectional view on the opposite page. Drill and tap one web of the bar for the handles, the holes spaced about 6 in. each way from the center. If you have a lathe at hand, the 1/2-in. handles can be shouldered down to 3/8 in. for threading to fit 3/8-in. tapped holes in the bar. If a channel is used as a bending bar, drill a clearance hole through one web so that the handle can be passed through and turned into a tapped



USE OF PIVOT PLATES INSTEAD OF DOOR HINGE

hole in the opposite web. This installation is shown in the upper detail above.

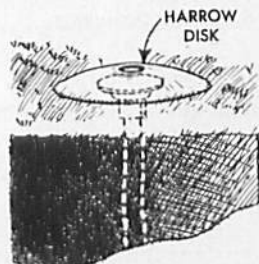
When installing the camming levers note in the details above that the threaded stud which carries the yoke-shaped cam is threaded into a tapped hole in the bed and passes through a clearance hole in the clamping bar. The important thing in shaping the webs of the cam is to make sure that both webs are precisely the same length and contour, as otherwise the clamping bar will be tilted when the cam is engaged. The distance measured inside between the cams should be about 3/4 in. The cam can be adjusted to lock up on metals of varying thicknesses (gauge) by changing the washer under the cams or by swinging the handle a half turn in or out. The handles should be about the same length as those on the clamping bar. ★ ★ ★

Small Anvil on Section of Tire Used by Seated Workman



When a small anvil is required for light work, a "leg anvil," which a workman can use while seated, eliminates fatigue caused by standing at a bench anvil. The anvil can be the sole-plate casting of an electric iron, or any suitable piece of metal. It is attached to a 6-in. section of auto tire which provides a "leg clamp." Flatheaded machine screws turned into holes drilled and tapped in the anvil bottom are used to hold it on the tire. When the screws are tightened the heads pull flush with the surface of the rubber.

Harrow Disk Protects Water Valve From Heavy Machines



marked it clearly so that it would not be buried under mud or earth during the construction.

To protect a water shutoff valve from damage by heavy machines during a construction job on his property, one farmer covered it with an inverted harrow disk. This not only protected the valve, but also

Wire Pattern Aids Pipe Bending

When bending a pipe or flexible fuel line to make a connection to a stove, or wherever the bending cannot be done on location, considerable time and work can be saved if a pattern is first formed of stiff

wire. Once the wire pattern is made, the pipe can be bent to the proper angles and measurements with a minimum of difficulty, greatly simplifying installation.—Glen F. Stillwell, Manhattan Beach, Calif.

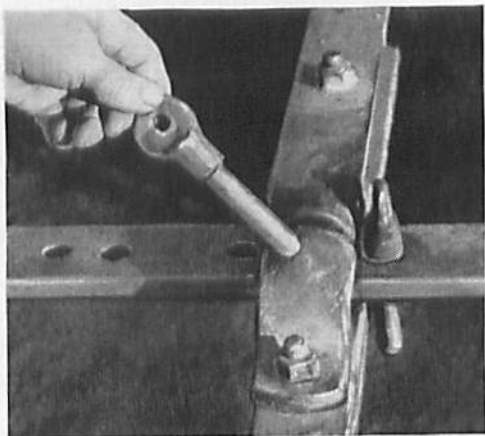
Stoppered Drain in Hog Trough Eliminates Heavy Lifting

Lifting a heavy hog trough to empty accumulated rainwater and dirt is not necessary if a drain is located at one end and fitted with a long wooden stopper. A length of dowel or heavy broom handle could be used. To prevent the animals from knocking the stopper sideways or loosening it, screw a heavy pipe strap near the top edge of the trough end and pass the stopper through it.

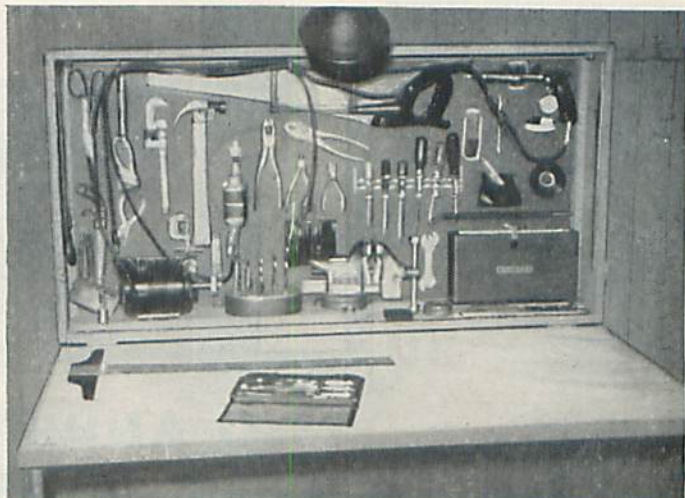
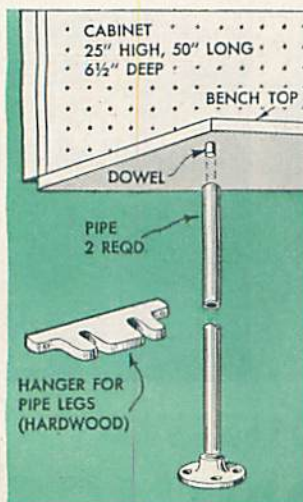


Faster Drawbar Adjustments With Welded Hitch Pins

For quicker centering and offset adjustments of a swinging drawbar, one farmer made his own hitch pins from $\frac{5}{8}$ -in. bolts. The heads of the bolts are cut off and a short length of pipe driven onto the bolts and welded in place. The eyes of the pins, which are malleable eyes taken from turnbuckles, then are welded to the pipe. The welded assembly is smoothed on an emery wheel and the opposite end of the pin is ground to a taper for easier insertion in the drawbar.



ⓈA regular ball-point pen is a good substitute for a mimeograph-stencil stylus.



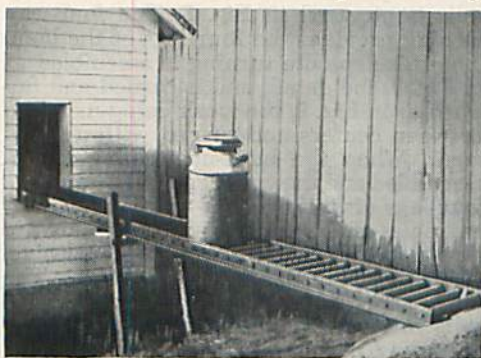
FOLDING WORKSHOP HANGS ON WALL

You can have a handy and practical workshop on the wall of your garage, the utility room or even in an apartment closet. The cabinet, or enclosed tool panel, hangs on the wall and the hinged door forms the bench top when lowered to the horizontal position. The back of the cabinet is a panel of perforated hardboard on which tools can be supported by metal hangers in almost any arrangement desired. The cabinet is simply a rectangular box, the original you see pictured above being 6½ in. deep, 25 in. high and 50 in. long. Of course, these dimensions can be varied to suit individual needs. The hinged bench top should be of 1½-in. stock, maple being the first choice and the most durable. Although not as resistant to dents and scratches, clear white pine is a good second choice of material. The vise pictured is of the swivel-base type and is bolted to the bench top when needed. Vises of the type which clamp to the bench top also can

By L. Elton Legg

be used to advantage. The legs are of the simplest construction, just a piece of pipe threaded at one end and turned into a floor flange. The upper end of each leg fits over a short length of hardwood dowel glued into a hole drilled part way through the bench top from the underside. If desired, two sets of legs can be provided, one set to hold the bench top level for working with tools, the other set 3 to 6 in. shorter to support the bench top in an inclined position for use as a drafting board. A hanger, cut from hardwood and attached to the wall, provides storage for the sets of legs when not in use. Attach the cabinet securely to the wall studs with roundhead screws driven through the perforations of the hardboard back panel. Be sure to use screws of sufficient length to reach through the plaster and lath into the studs. Use ¼-in. perforated hardboard for the back panel. Attach it to the cabinet with flathead screws spaced about 3 in. apart.

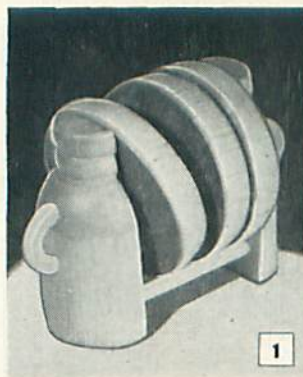
Milk Cans Carried by Conveyor From Milkhouse to Truck



An Ohio dairy farmer has minimized the labor required to load filled milk cans from the milkhouse to his truck by utilizing a roller conveyor. The conveyor leads downward from a door in the milkhouse to a large rock in the barnyard. The dirt in front of the rock has been graded so the height of the bed of the truck, when backed up to the rock, is equal to that of the lower end of the conveyor.

John Krill, North Lima, Ohio.

Ⓢ A broken tap need not be thrown away. Instead, if the broken end is ground to a point, it makes an excellent center punch.



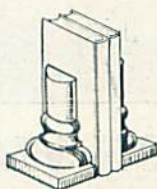
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2

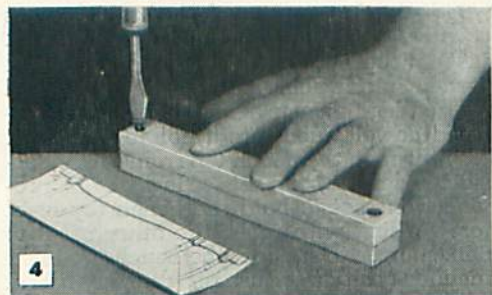


3



TWO AND FOUR-WAY SPLIT TURNINGS

By Sam Brown



4

FASTEN STRIPS WITH SCREWS OR GLUE



5

TURN WORK LIKE ANY SOLID SPINDLE



6

CUT OFF ENDS TO RELEASE HALVES

SINCE THE EARLIEST DAYS of the colonial cabinetmakers, split turnings have found a place in the design ornamentation of home furnishings. Two and four-way splits of spindle and faceplate turnings are perhaps the most commonly used, although other divisions of the spindle and faceplate turning are often useful. In some cases the halves of a four-way split are coped to form segments which are fitted to sides and tops to form radius, or "water-fall," corners. Fig. 7 is an example of this application in modern design. Other examples of the application of the split turning are pictured in Figs. 1, 2, 3 and 10.

The brown-jug, coaster set, Fig. 1, is a typical two-way split with the handle added to complete the design. Broken-column book ends, made as in the sketch below Fig. 1, also are typical of many novelty projects where the splits can be used in pairs. Fig. 2 pictures another application where the one split is a minor terminal feature of the design. Such units usually are made in pairs. An example of the four-way split is pictured in Fig. 3. The four-way turning provides the four legs of the lamp table. The spindle turning is assembled as in Fig. 7, the detail, and is turned and finished as in Fig. 9, the work being mounted between centers and turned with a slight taper. When the built-up turning is disassembled and the waste removed you have four legs of uniform size and taper. Other examples of the four-way split turning are shown in Fig. 11, details A to E inclusive, and also in Fig. 12, the upper details. The latter show typical assemblies made with split turnings A and E in Fig. 11. When preparing a split turning for a cope cut,

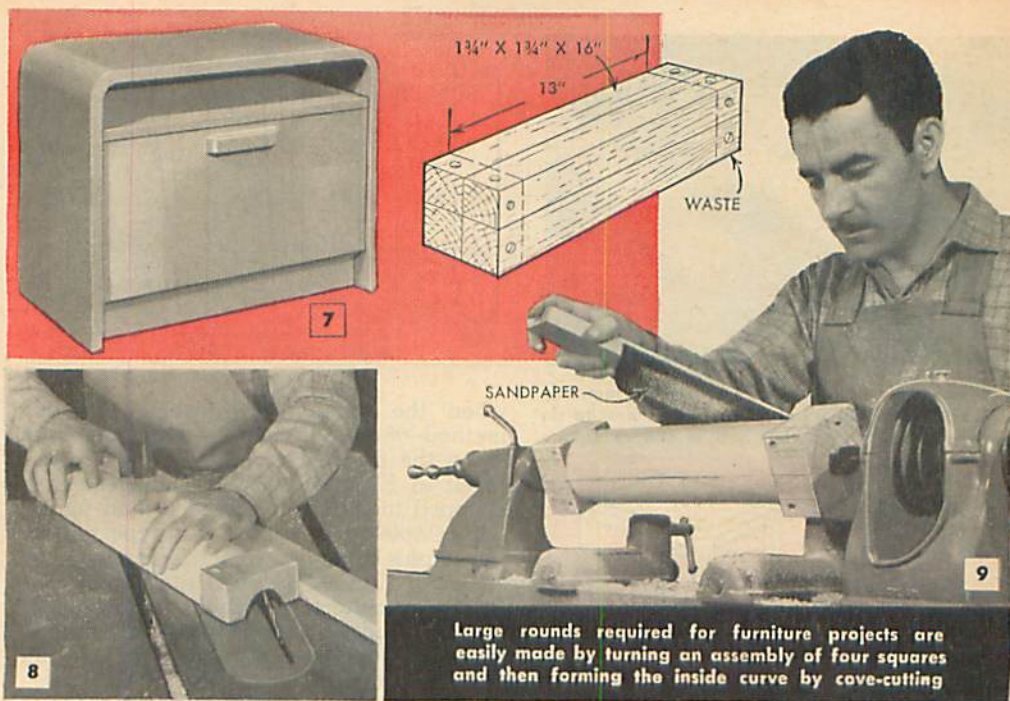
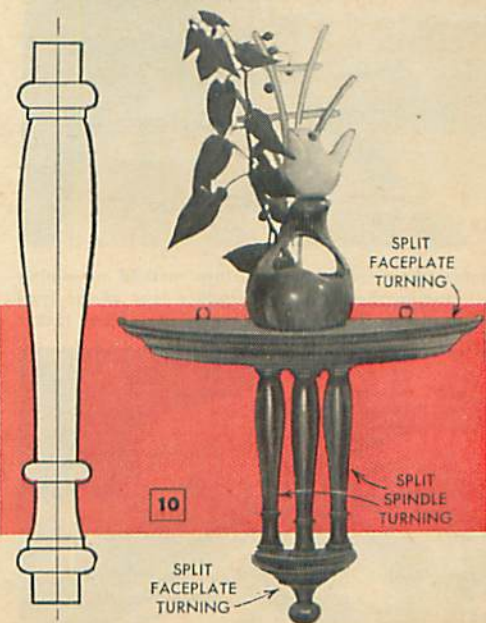
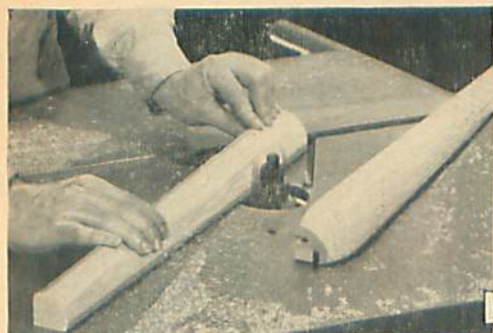


Fig. 8, be sure to locate the screws in the waste at the ends so that they will clear the saw blade when the cope cut is made to the desired depth.

There are several methods of assembling the stock for two-way and four-way split turnings. One of the most common is pictured in Fig. 4. The two pieces of stock are selected, ripped to width and the meeting faces are planed true. The over-all length of the pieces exceeds the finish length of the turning by at least $1\frac{1}{2}$ in., allowing $\frac{3}{4}$ in. of waste at each end. The thickness and width of each piece should exceed the required radius of the turning by at least $\frac{1}{16}$ in., or better, $\frac{1}{8}$ in. Then screws are driven into the ends outside the dimension lines as in Fig. 4. When the turning has been finished and sanded, Fig. 5, the waste ends are cut off, giving you the two splits, or halves, as in Fig. 6. This method is quite satisfactory for comparatively short turnings up to 12 in. in length and a small finished diameter of $\frac{1}{2}$ in. or more. However, for longer turnings the method has one pronounced disadvantage. When fastened only at the ends and not along the length, the halves tend to whip and separate at the higher lathe speeds, especially as the turning nears final form in the small and large diameters. This causes the trailing edges of each of the halves to splinter as they pass the cutting tool. In some applications this defect may not be objectionable, but in most cases the edges of the split turnings are exposed and any irregu-

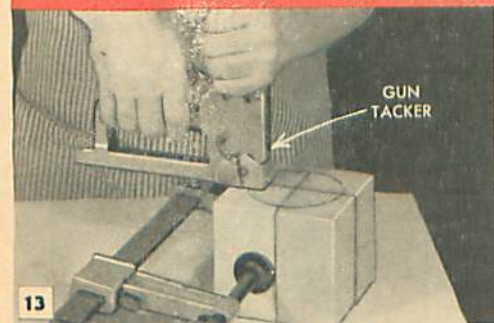
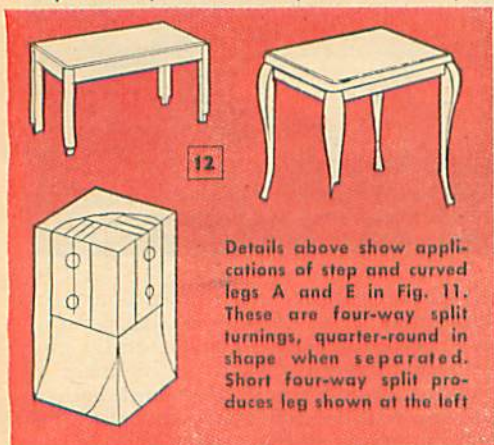
larity is difficult to conceal in ordinary finishing procedure. Because of this possibility, experienced craftsmen generally glue the strips together with a thickness of heavy paper between. A glue joint made in this way will be sufficiently strong to prevent whipping of the two halves of the turning, even at fairly high lathe speeds, and the two members are easily pried apart





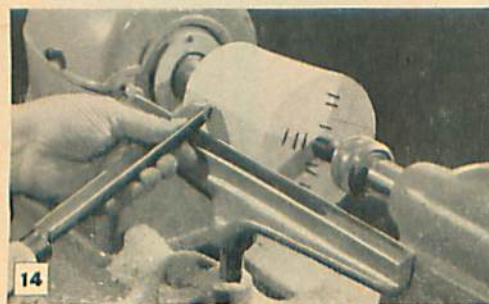
11

Some machine operations can be done on four-way splits after separation, but as a rule it's best to do this preliminary work while job is still in square

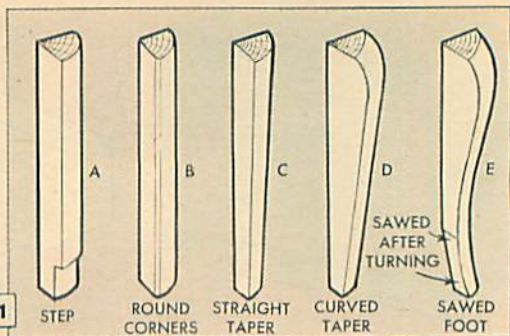


13

Photos above and below picture method of joining and turning short stock to produce legs of the type shown in Figs. 12, 15 and 17. Note use of gun tacker



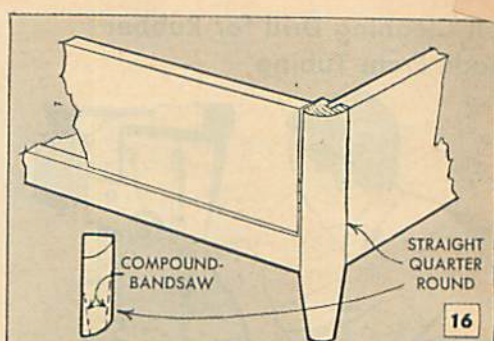
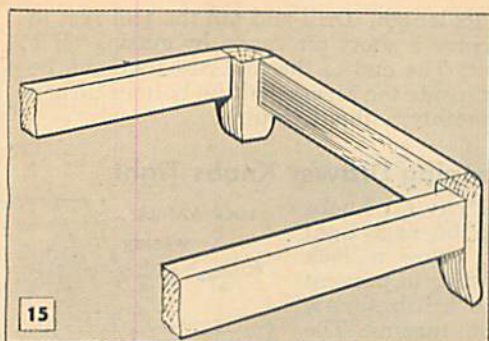
14



when the turning is finished. Another method of joining two or four members when the finished turning is short is pictured in Figs. 13 and 14. The pieces are clamped together as in Fig. 13 and joined with staples driven by a gun-type tacker, the staples being driven across the joints as shown in Fig. 14 in such a position that they do not interfere with the lathe centers. This method is especially effective when joining pieces to make short legs of the type shown in the lower detail, Fig. 12, also in Figs. 15, 16 and 17. In this case, the outer contours of the legs are finished by turning and the inner curves are band-sawed as indicated on the details and photo, Fig. 17. Where curved legs are to be joined to rails by doweling or mortise-and-tenon joints, it generally is best to cut the mortises or bore the holes for dowels before the members are joined for turning. This procedure provides four working surfaces for these preliminary operations. For some operations two adjacent working faces will suffice, as in the photo, Fig. 11. In this case, supplementary machine operations can be carried out after turning.

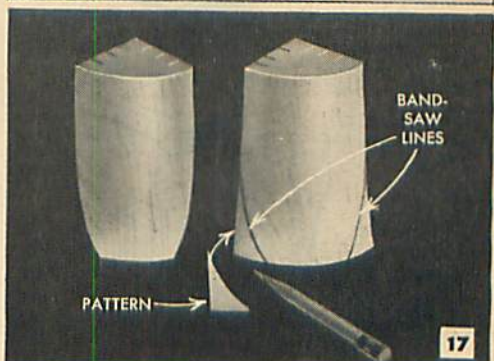
When mounting either the two-way or four-way split turning in the lathe, special care should be taken in centering. If the center is offset, even slightly, the turnings will be of unequal size. As a rule it's best to drill a small pilot hole in the end grain to take the point of the lathe center. If the center is driven into the wood without first drilling a pilot hole there is the possibility that the point may follow the grain. This tendency could throw it off as much as $\frac{1}{8}$ in. or perhaps even more in some woods. On small-diameter turnings this much offset could result in a noticeable variation in the size of the splits. In centering, always mark diagonals from the four corners and then drill the pilot hole on the intersection of the lines.

When working large turnings, such as that pictured in Fig. 9, always use the slowest speed of the lathe until the work is turned into round, or very nearly so. On straight turnings and those with long,



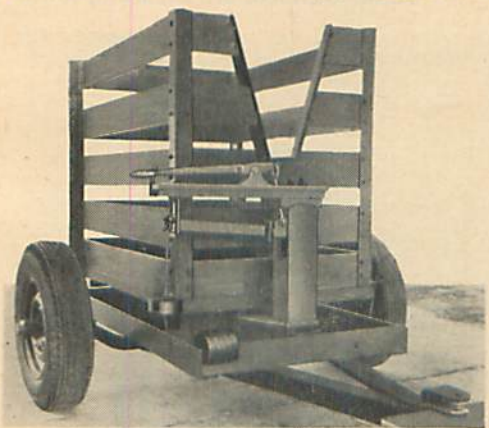
sweeping curves, use the gouge for roughing and the skew chisel for the finishing cuts. These tools give a shearing cut with very little tendency to chip the stock at the trailing edges. Avoid use of the scraping tools such as the round and square-nosed chisels and the parting tool, except where necessary to produce the form desired. Keep the tools razor-sharp by frequent honing on a fine oilstone or a leather strop.

Select straight-grained stock for making split turnings of either hardwood or softwood. Avoid cross or oblique graining and never attempt to assemble stock for split turnings from pieces containing encased (loose) knots. Nearly all hardwoods and softwoods are suitable, except possibly those having a coarse, open grain which may cause some trouble by chipping at



the trailing edges. However, should the edges chip lightly it is possible to remove this by running the parts over a jointer, one pass usually being sufficient to remove any irregularity at the edges. ★ ★ ★

Platform Scale on Trailer Used for Field-Weighing Calves



A regular 1000-lb. platform scale was incorporated in the construction of this two-wheeled trailer built by the boys of the Hays County Vocational School in San Marcos, Tex., to provide a portable scale for field-weighing calves. The scale is used extensively by the 4-H boys and the County Veterans for checking the progress of livestock projects. The heavy steel-angle

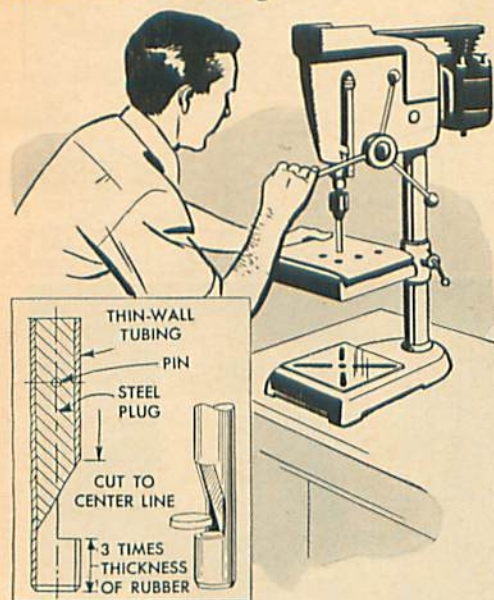
frame of the trailer is welded rigidly to the axle; spring sway would cause inaccurate weighing. The livestock rack is fixed solidly to the scale platform and both rack and platform are held steady in transit by hold-down bolts. These are lengths of round stock bent to a U-curve on the bottom end and hooked into holes in the four corners of the trailer frame. The threaded top ends pass through holes in brackets welded to the angle on the bottom edge of the stock rack.

Bush Ewing, San Marcos, Tex.

Wood Putty on Masonry Wall Provides Support for Vines

Supports for vines on a brick, stone or stucco wall can be held in place with wood putty, which is weatherproof and waterproof and will adhere firmly to any type of masonry. Form the putty into ball-shaped pieces, slightly larger than the end of your thumb and press them against the wall, flattening them slightly. When the pieces have hardened, drive small staples into them to hold guide wires or string.

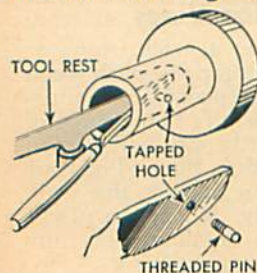
Self-Cleaning Drill for Rubber Made From Tubing



There is no need to stop work to clean this rubber-cutting "drill" which clears itself by ejecting the waste rubber through a notch in the side. The drill is a length of thin-wall tubing, its lower end filed to a cutting edge. The notch cut in its side is located so the lower end is about three times the thickness of the rubber above the end of the drill. A snug-fitting steel plug now is forced into the tubing, its lower end being cut to an angle matching that of the notch. The plug is held in place by a steel pin riveted in a hole through the tubing and plug. In use, as the waste disks of rubber are forced up into the drill from the holes drilled in rubber, they are forced up the angle of the plug and spun out through the notch. If a drill press is used, it should be run at slow speed and the drill lubricated with water.

C. E. Seifert, Swampscott, Mass.

Pin on Lathe-Tool Rest Aids in Making Internal Cuts

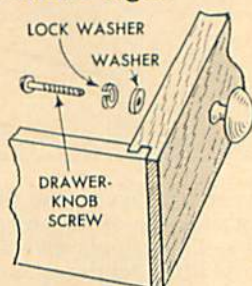


When making deep, internal wood-turning cuts of small diameter, the end of the cutting tool can be properly supported by fitting a pin into the end of a conventional tool rest at right angles

to its length. Drill and tap the tool rest to receive a short pin made by cutting off a bolt. The end of the tool rest then can be set inside the recess and the bottom turned smoothly without trouble.

Keeping Drawer Knobs Tight

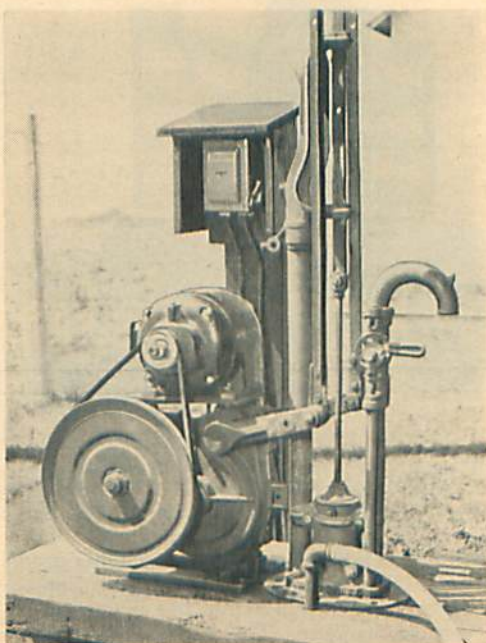
Drawer knobs can be kept tight by using a lock washer to prevent the knob screw from turning. The lock washer should be placed between a flat washer and the head of the screw. Do not locate it against a wooden surface because it will sink into the wood and lose its locking ability. Lock washers also are effective for keeping wooden knobs tight on the lids of pots and pans.

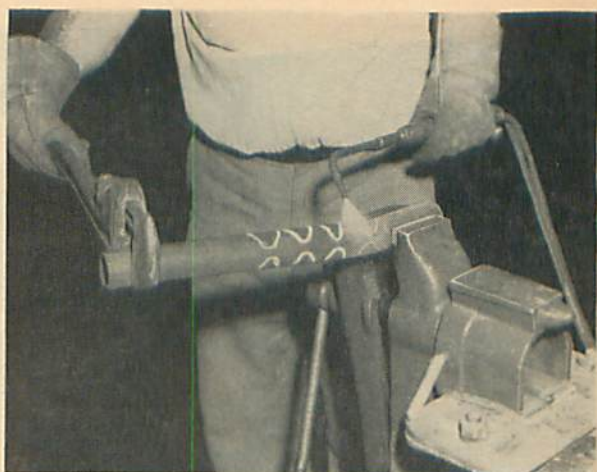


Pump Switch Weatherproofed By Wooden Cover

As a safety precaution, and as protection against rain, snow and ice, an electric switch for a water-pump motor was mounted on a 2 x 8 plank nailed to the side of the well platform, and boxed in with a top and sides of 1-in. lumber. All electrical fittings are weathertight, outdoor type, and the motor is waterproof and weatherproof.

A. M. Wettach, Mt. Pleasant, Iowa.





Photos by Kerwin

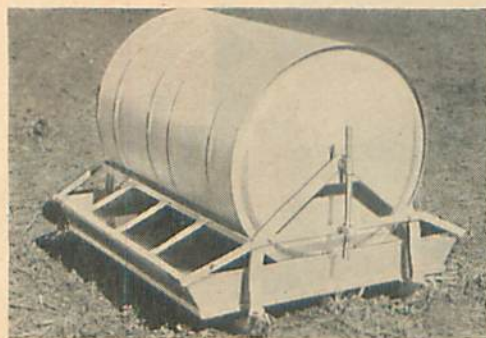
"WRINKLE" BENDS IN PIPE AND TUBING

By Harry and Keith Kerwin

Often a bend in a length of pipe is helpful or necessary when roughing in a plumbing or pipeline layout. Also, it is sometimes desirable to install pipe with a bend at some point in the line to provide for expansion and contraction with temperature changes. Using ordinary, on-the-job methods, it is difficult to bend pipe or seamless tubing more than a few degrees without flattening and greatly weakening the pipe or tubing at the bend. However, by applying heat and moderate pressure, it is possible to wrinkle-bend pipe or tubing as much as 45 deg. without impairing its usefulness in any way. The procedure is simple. First, locate the center of the bend and make a series of chalk marks as shown in the photo, the chalk marks enclosing diamond-shaped areas which are spaced about $\frac{1}{2}$ in. apart. Then, beginning at one end, apply heat from an acetylene torch to the area enclosed by the chalk mark as in

right-hand photo above. Bring the metal to a dull straw color before applying bending pressure with a pipe wrench as pictured. Bend only a few degrees, then allow the metal to air-cool. Do not quench. Then heat the adjacent chalked area and repeat the procedure, allowing the work to air-cool as before. Continue the heating, bending and cooling process along the length of the bend. The number of heated areas determines roughly the length of the bend that will be formed in the pipe. When heating the separate areas enclosed by the chalk marks care must be taken not to apply the flame to those spaces between. As will be seen in the left-hand photo, the heated areas compress and fold as pressure is applied while the cooler areas between remain flat and act as "fulcrums." Wrinkle-bending in this fashion prevents any tendency of the metal to stretch and thin on the outside of the bend.

Oil Drum Used as Hog Waterer Automatically Fills Trough



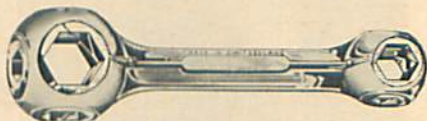
Made from a 50-gal. steel drum mounted above a wide trough, this hog waterer works like the popular poultry waterers. When the drum is filled and then rotated to bring the open bung down to the underside, water escapes into the trough until the level rises to cover the bung, after which water escapes only as the level in the trough is lowered. A T-fitting on one axle permits a steel rod to be used as a turning bar when the drum is rotated for filling. The bar also is used as a lock to position the drum by slipping the lower end of the rod into a collar welded to the angle.

SHOPPING



ACCESSORY RACK utilizes new Peg-Board and special metal fixtures, or hangers, for grouping power-tool accessories right on the machine where they are always within handy reach. Peg-Board can be cut to any size or shape required to fit floor stands of individual machines and hangers arranged to accommodate any number of commonly used accessories such as circular-saw blades, sanding disks, belts, pulleys and wrenches

Masonite Corp., 111 W. Washington St., Chicago 7

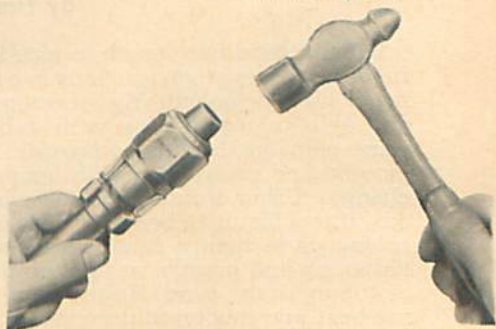


10-SOCKET WRENCH fits 10 different hex nuts up to 19/32 in. Rounded heads enable user to reach nuts in places inaccessible to ordinary wrenches. Wrench is 4 in. long, chrome and nickel-plated to prevent rust

J. E. S. Co., 111-49 Lefferts Blvd.,
So. Ozone Park 20, L. I., N. Y.

TUBE-FLARING TOOL puts a perfect flare on copper, aluminum-alloy and annealed-steel tubing with only a few light hammer blows. Unit consists of a sleeve and a flaring pin. Tubing is inserted in end of sleeve

Parker Appliance Co., 17325 Euclid Ave.,
Cleveland 12, Ohio

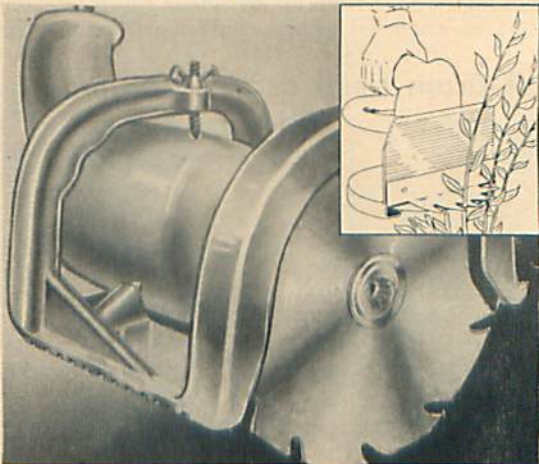
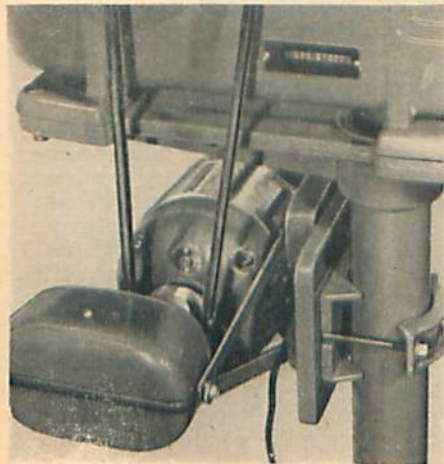


SPEED CHANGER fits either a 1/2 or 3/8-in. motor shaft and gives a 10-to-1 speed reduction for cutting metals on an ordinary bandsaw. Can be changed back to wood-cutting speeds in a few seconds. Transmits full power of motor at either setting. Moving parts are enclosed in metal

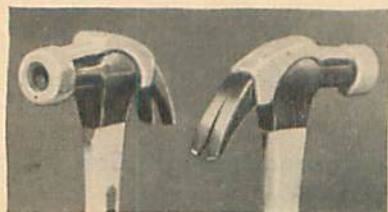
Savage Mfg. Co., Phoenix, Ariz.

SAW ATTACHMENT fits portable electric drills of 1/4-in. capacity. Special 6-in. blade cuts 2 x 4s in one pass, without turning the stock over. Unit can be inverted, locked in a vise and used as a table saw for cutting small pieces of stock. Standard unit is furnished with a hedge-trimming attachment. Universal holder supports electric drill rigidly

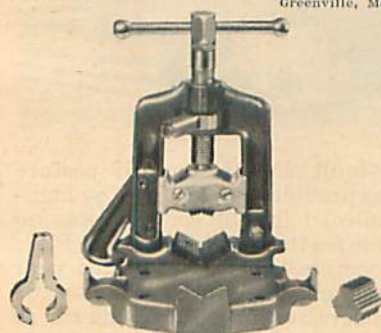
Master Saw Co., 1842 W. Washington Blvd., Los Angeles 7, Calif.



FOR TOOLS



HAMMER GUARD prevents marring or denting surface of finished stock when driving or pulling nails. Guard also permits use of nail hammer as a "soft" hammer on assembly work requiring nonmarring blows
Highland Industries, Moosehead Lake Highlands, Greenville, Me.



PIPE VISE adjusts automatically to hold $\frac{1}{8}$ to 2½-in. pipe. Quick-acting clamp screw tightens on the work in less than one full turn. Bending lugs extend from both sides of the base for convenience
Pipemaster, Erie Tool Works, Erie, Pa.

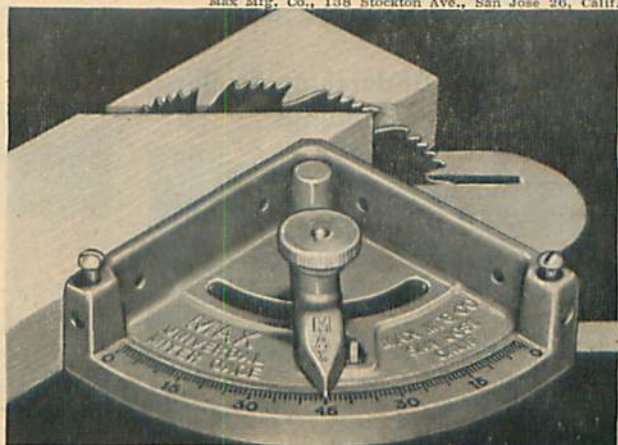
SCREWDRIVER ATTACHMENT for portable electric drills drives screws fast in hard or soft wood. Comes in two sizes for light and heavy duty. Drives screws to uniform tension without stripping

Supreme Products, Inc.
2222 S. Calumet, Chicago 16



ROUTER GUIDE rotates the form block in a circular movement around the stationary router bit, thus reversing routine procedure in hole cutting on a routing machine. This permits cutting the hole to the required size in one pass, eliminating sanding and other finishing operations. Work swings on a tapered point which centers in a pilot hole drilled in the work in a manner similar to the movement of the work on a circle-cutting jig on a bandsaw. The tapered point holds the work securely preventing any sidewise movement to cause inaccuracy
Temco Aircraft Corp., P.O. Box 6191, Dallas, Tex.

UNIVERSAL MITER GAUGE for circular saws and other power tools having grooved tables has working faces at right angles, giving the user a full range of single and complementary-angle settings. Gauge swivels at a point near the corner of the adjacent faces. Either of the working faces can be set parallel with the saw blade or at right angles to it. The standard guide bar is $\frac{3}{8}$ x $\frac{1}{4}$ -in. steel
Max Mfg. Co., 138 Stockton Ave., San Jose 26, Calif.

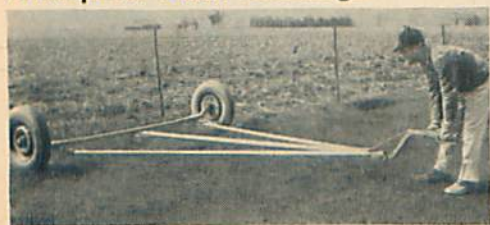




Farm Equipment Modernized With Drawbar Extension

Quicker, easier hitching and better towing and turning control are provided for the older equipment on one farm by bolting on drawbar extensions fitted with quick-hitch rings. The extensions are made by welding two lengths of steel channel to form a box girder. The welded seams at one end of the box then are cut out to permit inserting the hitch-ring pad which is welded in place. A support to keep the drawbar at hitching height is shaped from flat steel and pivoted to the drawbar extension near the end as can be seen in the photo.—Charles L. Stratton, Hollis, N. H.

Two-Wheeled Underslung Trailer Transports Farm Buildings



Built especially for transporting portable hog shelters and other structures around a farm, this low two-wheeled trailer has an

axle 10 ft. long. A front axle from a car was cut in half, then welded to the ends of two auto drive shafts, which then were welded together to provide the extra-long axle. The "bed" of the trailer is three 13-ft. lengths of 2-in. pipe. Flat-steel pads welded to the axle end of each pipe are bolted to corresponding pads welded to the axle. The front ends of the pipes are welded to a "step down" bracket bent from a length of steel channel to carry the tractor hitch.

Discarded Railroad Freight Car Is Pasture Granary

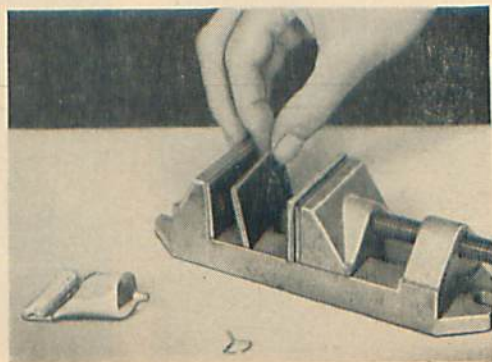


A ready-built weatherproof pasture granary was provided on one farm by hauling in a railroad freight car that was no longer usable for its original purpose. Piers made of concrete blocks are located near each end of the car as supports and cattle and hog feeders are placed near the car so feed handling requires a minimum of time and labor.

Leather Facings on Vise Jaws

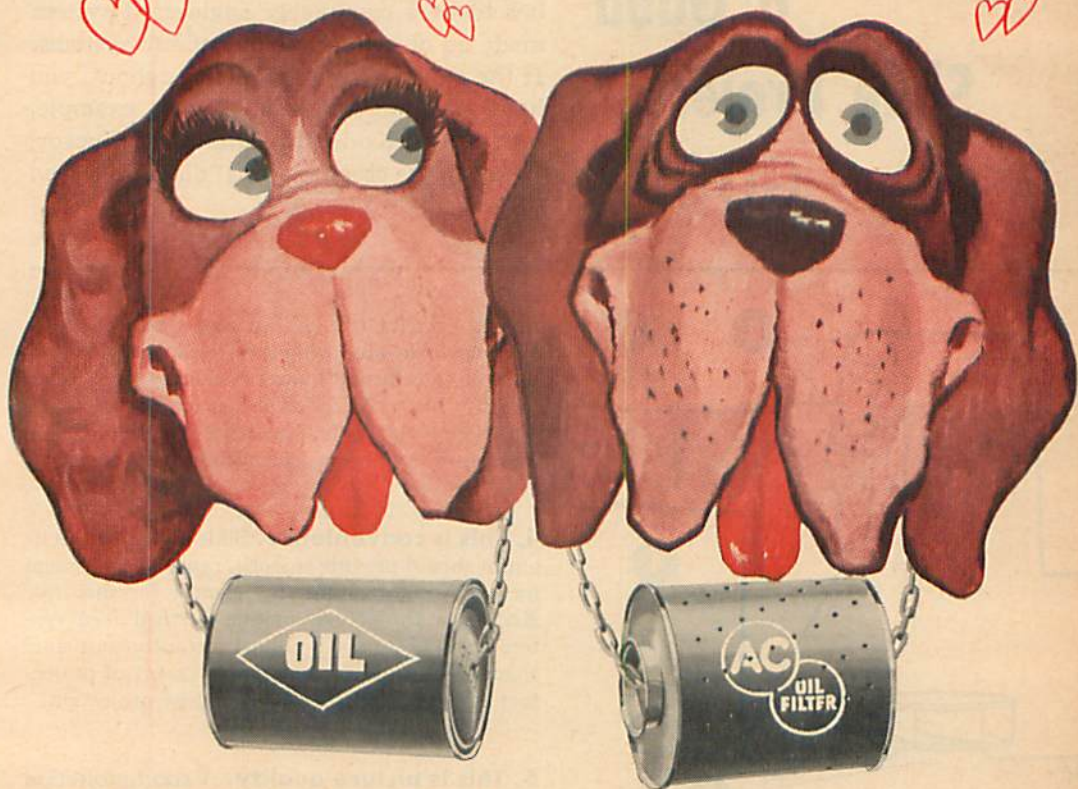
Pieces of leather belting can be cut to make excellent facing material for vise jaws. The leather, which can be fastened in place with household cement, minimizes the danger of marring the surface when clamping wood or brass, and round or irregularly shaped work is more securely gripped because the facing tends to fit itself to the work.

Richard Hanscom, Elmhurst, Ill.



POPULAR MECHANICS

Ah-h-h Spring!



Time to **CHANGE OIL** and **OIL FILTER!**

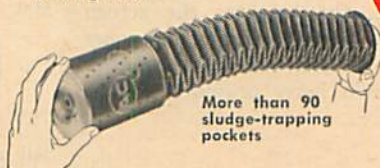
Buds are budding, leaves are leafing, spring is springing. Folks everywhere know the first robin is a sign that it's time to change oil and oil filter, too.

An AC Filter keeps oil free from harmful dirt, protects your car's engine from the damage dirt can do. In fact, an AC Filter takes out particles as small as 1/100,000 of an inch... *without removing the detergents from heavy-duty oils!*

So, change to clean oil now, and *keep* it clean with a new AC Oil Filter. Change your AC Filter every 5,000 miles. That's the best way to keep "spring" in your engine all year long — and for years longer!

RESCUE
your car
with ...

10 times the
filtering area



Watch
BIG TOWN
NBC-TV



AC SPARK PLUG DIVISION • GENERAL MOTORS CORPORATION

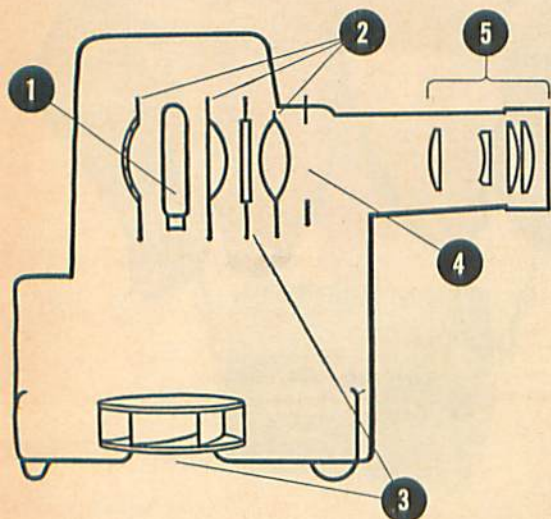
THE ONLY FACTORY-APPROVED FILTER FOR CADILLAC • BUICK • OLDSMOBILE • PONTIAC • CHEVROLET • GMC

MAY 1955

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What makes a Good Slide Projector GOOD?

You can't judge a car by its coat of paint. Likewise, there's more to making a good color slide projector than meets the eye. It has to be a completely engineered system made up of several important sub-systems. If the engineering is good throughout, you have a good projector. As an example, let's use a Kodaslide Signet Projector, shown in the cross-sectional diagram below.



1. This is basic power. The higher the lamp wattage, the brighter the screen image. Choose enough wattage to meet your particular needs. 500 watts, with an efficient condenser lens system, provide extra-brilliant big pictures. 300 watts give intermediate brilliance. If you're looking for economy, 150 watts often provide adequate illumination.

2. This is efficiency. A projector's condenser-lens-and-reflector system collects and directs the light from the lamp to your slide. The more efficient this system, the brighter the screen illumination. While a single condenser lens may be used, a compactly designed two-lens condenser system, such as shown here, provides greater efficiency.

3. This is safety. Since all lamps radiate heat, special protection for slides is required with higher wattage lamps. For best protection this

should consist of: (a) an extra-thick, high-efficiency heat-absorbing glass between lamp and slide, (b) an efficient blower cooling system (make sure the blower is quiet and provides a smooth flow of air) and, (c) baffles to direct air in channels over lamp, condenser lens system, and slide.

4. This is convenience. Slide-changing mechanism should provide smooth, rapid scene change for eye comfort; offer no chance for mix-ups. Kodaslide Projectors' unique vertical feed system provides smooth, almost instantaneous slide change; prevents jarring or movement of projector; eliminates unintentional repeat projection.

5. This is picture quality. A good projection lens will faithfully reproduce on the screen all the color and detail of your slides with edge-to-edge sharpness and clarity. Such fine definition and color correction are found in the 5-inch Kodak Projection Ektanon Lenses. You have a wide choice of projection distances and picture sizes to fit living room, classroom, or auditorium.

Lamp Wattage		Screen Width	Distance from Projector to Screen 35mm (24 x 36mm) slides
500	300	150	30 inches
		150	4 feet
		150	5 feet
		150	6 feet
		150	7 feet
		150	9 feet
			10 feet
			15½ feet
			19 feet
			23 feet
			25½ feet
			32½ feet

All of the above essentials have been given due weight in designing Kodaslide Projectors (see facing page). Your Kodak dealer will be glad to demonstrate them and give you specific advice.

Here are the newest Kodak projectors

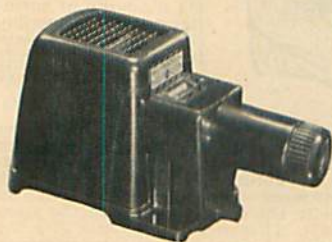
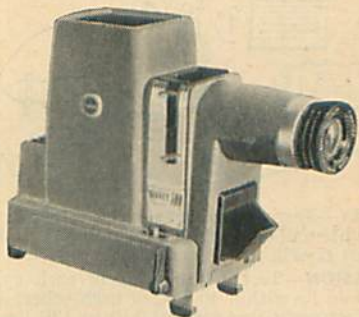


Kodaslide Signet 500 Projector

Lumenized optics, 500-watt lamp for amazingly bright pictures; Kodak Projection Ektanon Lens, 5-inch $f/3.5$; automatic take-up changer gives smooth, quick slide changing; slides stacked in order shown, in receiver or Kodaslide Box (see below); accepts Airequipt Changer; individually spring-loaded front legs for 0-12° elevation; adjustable rear leveling leg; quiet, powerful impeller-type blower. \$72.50. With 5-inch $f/2.8$ lens, \$79.50.

Kodaslide Signet 300 Projector

Budget-priced 300-watt version of Signet 500. Has same superb optics, unique slide-handling system, many other features of Signet 500. With $f/3.5$ lens only. \$59.50.

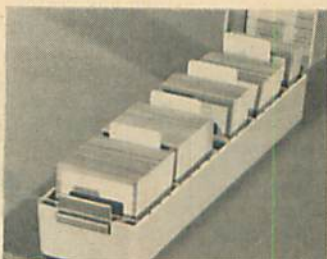


Kodaslide Merit Projector

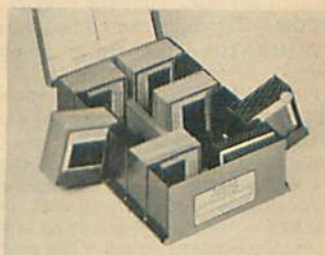
150-watt lamp; fine 5-inch $f/3.5$ Lumenized lens; non-jar feeding; convection cooling; surprising brilliance and clarity at modest cost. Only \$23.95.



KODASLIDE BOX—Holds 20 cardboard slides. Serves as slide receiver with the Signet projectors. Fits into Kodaslide Ready-File. 6 for \$.75.



KODASLIDE READY-FILE—Just right for carrying. Holds 200 cardboard or 100 stereo slides. Accepts 6 Kodaslide Boxes. Includes index. \$1.95.



KODASLIDE COMPARTMENT FILE—Holds 240 cardboard or 96 glass slides. 12 swing-out compartments. Includes index. \$.394.

Prices are list, include Federal Tax where applicable, and are subject to change without notice

EASTMAN KODAK COMPANY
Rochester 4, N. Y.

Kodak
TRADE-MARK

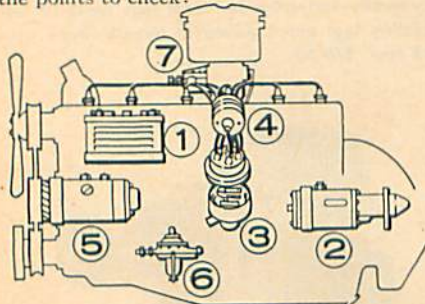
Care and Feeding of Engines

BY
S. P. CORP



TUNE-UP TIME

Lagging engine performance calls for a tune-up. Here are the points to check:



1. BATTERY—Test voltage of each cell. Cells should be equal. Tighten all connections, including those behind instrument panel.

COMPRESSION—Test compression of each cylinder. They should be within 10 lbs. of each other, and up to manufacturer's standard of 110 to 120 lbs. Low reading indicates leaking rings, valves, or head gasket.

VACUUM TEST—A vacuum gauge connected to intake manifold may indicate poor ignition, carburetion, or compression, which may be due to one of the following:

2. STARTER MOTOR—Test voltage and amperage draw while starter is cranking engine. See diagram.

3. DISTRIBUTOR—Remove and check in a distributor tester for operation of all speeds. Test manual and vacuum advance. Time the engine.

4. COIL—Use coil-tester to test output at all speeds.

5. GENERATOR—Test against manufacturing specifications.

6. FUEL PUMP—Test pressure, vacuum, and volume.

MUFFLER SYSTEM—Check for any exhaust restrictions.

CYLINDER HEAD—Tighten all cap screws and manifold nuts to specifications, while engine is hot.

7. CARBURETOR—Clean carburetor and air screen; check float level and jets against specifications.

VALVES—Adjust tappets while engine is hot, unless manufacturer says adjust while cold.



NEW FREE REFERENCE BOOKLET

A post card request will bring your free copy of "Care and Feeding of Engines," with many valuable do-it-yourself details on car care. Use Sealed Power KromeX Ring Sets for immediate oil control, finest performance, and longest wear in modern engines. Sealed Power, Dept. G-5, Muskegon, Michigan.

Sealed Power

PISTON RINGS

Clinic for Homemakers



As a service to our readers in solving the hundreds of problems pertaining to a home—inside or out—the editors of *Popular Mechanics* invite you to present your problems to The Clinic Editor for help and advice. Address your questions to The Clinic Editor, *Popular Mechanics Magazine*, 200 East Ontario Street, Chicago 11, Ill.

Dwarf Fruit Trees

Q—I have only a very small space on my lot for tree planting, two areas about 6 x 6 ft. I've wondered if I could plant two dwarf fruit trees in each area, giving me a couple of varieties of apples, possibly the type which is said to bear several kinds on the same tree. Is this plan practical?

S.M., Va.



A—For two trees, yes; four trees, no. Two trees planted even cornerwise in each of the areas you have available would interfere and this would affect growth and the ability to bear fruit. We think you would find it more satisfactory in the long run to plant one tree in the center of each of the areas you have available. This procedure would give the root system plenty of room without interference from any nearby tree or plant, would permit adequate circulation of air and admit sunlight for the development and ripening of the fruit. All these requirements are quite important in making a successful planting. It is equally important to make sure that you follow the instructions for planting which come with the trees, particularly those instructions which direct you how to dig the hole and how to spread and place the roots.

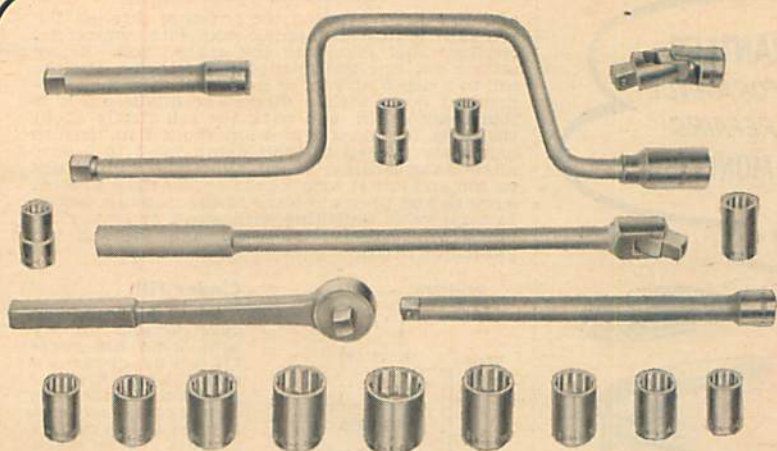
Transplanting

Q—How does one do successful transplanting of tender seedlings in heavy soils which harden and crack on drying? What about use of a soil conditioner? I have a new garden plot of the most stubborn soil imaginable and my experiences in the last two seasons have been anything but gratifying.—V.H., Ky.



A—If we can judge correctly from your description of the problem, the soil you are attempting to work is in need of sufficient organic matter to render it more friable. It is possible that a soil conditioner would prove satisfactory, but its use will not necessarily remedy the basic defect, which is lack of humus in sufficient quantity to promote bacterial action and aerate the soil. The next time the plot is spaded, either in spring or fall, cover the ground with leaf mold, rotted straw, prepared compost or peat moss and spade under to a depth

(Continued to page 226)

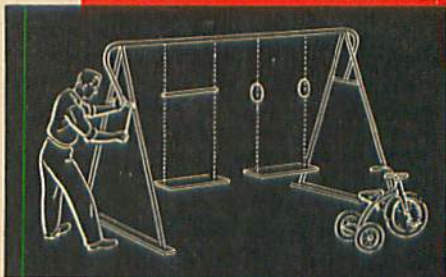


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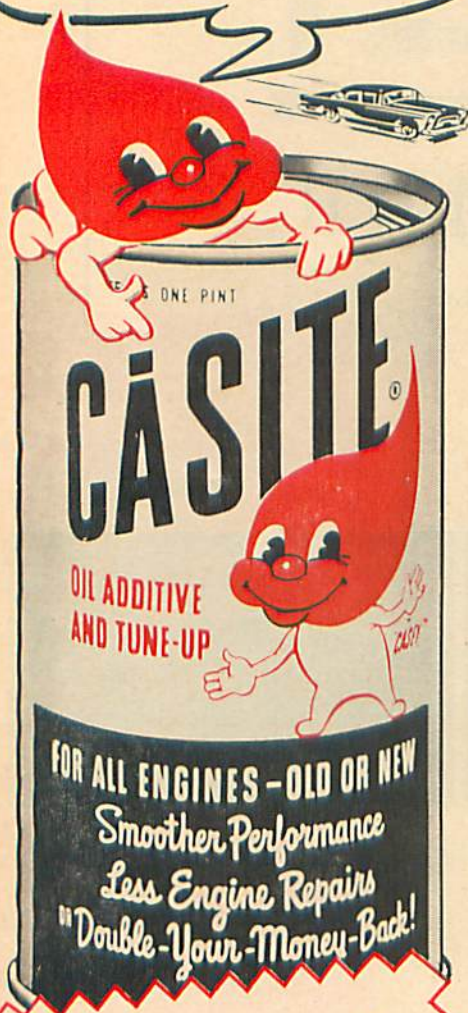
The BON-E-CON No. Z245B Socket Set contains 19 pieces in a strong metal box. You get 13 of the most useful $\frac{1}{2}$ " square drive double-hex sockets... 15" handle... 16" speeder... 5" and 10" extensions... 10" reversible ratchet... and universal joint. Other sets available in $\frac{3}{8}$ " and $\frac{3}{4}$ " square drive.

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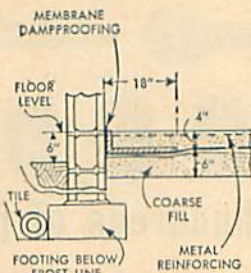


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Only \$1.00

(Continued from page 224)

of 3 to 5 in., scattering the covering through the soil as it is turned. Apply a complete commercial fertilizer and rake into the spaded soil. Before setting out tiny transplants in the spring, stir the soil to a depth of 3 in. or more and then make individual holes with a dibber, or dibble, as it is sometimes called, and pack the soil firmly about the roots, leaving a depression about 1 in. deep to hold water. Keep the soil damp for 3 to 5 days after transplanting. Then allow the soil to dry on top and stir it with a rake or wheelhoe to form a mulch and prevent escape of the moisture below. In some cases mulching with straw or grass clippings will conserve moisture and prevent the growth of weeds.



Cinder Fill

Q—In planning the construction of my new home the question has come up about what kind of fill to use under the concrete. I've been advised to use cinders as this fill is much cheaper than screened gravel. I've also been told that cinders disintegrate in time. Which information is correct?—O.B., Miss.

A—We assume you are referring to the construction of the floor of a basementless house. We could not recommend the use of cinders as a fill under a concrete slab floor for the reason you already have been given. For that matter we could not recommend the use of cinders as a fill under any type of concrete construction. The construction that is recommended is shown in the accompanying drawing featuring concrete-block walls. Note especially on this drawing the depth of the fill recommended, the thickness of the floor and the manner of dampproofing and insulating at the edges of the floor with a specially designed rigid insulation made specifically for the purpose. Note also the position of drain tile with relation to the footing, which is below the frost line.

In general, a basementless house should not be built in areas where there is poor drainage or a high water table or where there is danger of flooding from an accumulation of surface water. In any case, the grade should be at least 6 in. above the surrounding area, better a foot or more, unless, of course, the structure is built on a rise of ground which slopes equally away in all directions. Both the subgrade and the fill must be compacted by tamping the entire area. The fill should be coarse gravel or crushed stone. Next comes a grout coat composed of 1 part cement and 3 parts sand. This is leveled to a thickness of about 1 in. Some builders use a grout coat $1\frac{1}{2}$ to 2 in. thick under large slab floors. Its purpose is to provide a smooth surface over which the membrane dampproofing can be laid without danger of breaking. The membrane consists usually of one layer of asphalt-impregnated roofing felt. This is mopped with hot asphalt over the surface of the grout which already has been coated with hot bituminous material. Note in the drawing that the membrane is carried up to the floor level along the walls. This is an important detail and care must be taken not to break the felt at any point on the vertical surface or at the corner where the grout joins the wall. The exercise of special care in this phase of the installation will assure a dampproof floor. The membrane should cover the entire floor area and joints should be lapped 3 to 5 in., with 4 in. a safe average.

Note also from the drawing the placement of the rigid insulating material which extends horizontally 18 in. from the wall and vertically to the top of the floor slab. Some builders extend the membrane and the insulation an inch or two above the level of the top floor. The thickness of the floor slab above the membrane is given as 4 in., the top of the floor being 6 in. above grade. The 4-in. thickness given is a maximum figure. Reinforced top floors $2\frac{1}{2}$ to 3 in. thick give good service in homes of average size, provided all details of the construction are carried out according to recommendations. The slab should always be reinforced with wire mesh, a 20-lb. mesh being commonly used.

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IN THIS
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Get this new polished aluminum stem "Park Lane" pipe with interchangeable imported briar bowl and exclusive "dri-dome" which traps moisture to insure a dry, cool smoke—along with 2 full-sized pouches of Holiday Tobacco. If your dealer cannot supply you, use this handy order blank.

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Mail with \$1.50 to Park Lane, Larus & Brother Company, Inc., Richmond, Va.
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you put up from inside in seconds



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TENSION SCREENS

Columbia-matics fit outside the window, just like ordinary screens, yet they go up from inside. They are the revolutionary new screening idea that saves you time and money and lets you say good-bye to old-fashioned screen troubles.

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Columbia-matics cost no more than ordinary screens. Millions now in use. Get the facts at your screen dealer's. Or mail coupon.

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Send facts on Columbia-matics

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Address

City Zone State

In Canada write: Cresswell Pomeroy, Ltd., Montreal 28

Ideas That Paid Off

(Continued from page 139)

easier to turn the tanks inside out and paint them. The company not only gave its okay but a cash bonus as well.

Self-defense was a factor, too, in William Dourlain's case. An electrician with Universal-Cyclops Steel, he found that every time he turned around someone was after him to replace lights smashed by moving cranes. Finally, in desperation, he devised a shock absorber that solved his problem.

Often prize-winning suggestions are simply the result of a worker's keeping his eyes open. William Wroblewski is \$1300 richer because he took a second look at an electric fan turned out at the Westinghouse plant where he works. He suggested that the metal safety screen on the fan, instead of being perfectly round, should be cut in a slightly different shape to fit so tightly that no felt strip would be needed to prevent vibration. His boss concluded he was absolutely right and that is the way the new-model fans are being made.

Thomas While of Goodyear is also an enthusiastic advocate of the eyes-wide-open theory. He got his inspiration for a tube demonstrator while watching his daughter playing with some toy balloons. His payoff was \$1500.

A change of scenery proved just the thing to stimulate another Goodyear employee. During a guided tour of a nearby department, he watched a girl trimming rubber heels. He noted that after doing one side, she had to reach down for a lever to adjust the machinery for the other side. Next day he dropped this note into the suggestion box: "If a foot pedal were put on to tilt the table, the girl would have both hands free for her work." The suggestion was adopted and the girl's output shot up 25 percent. When the superintendent of the factory heard about this, he summoned the department foreman.

"Where have you been for the last 25 years?" he complained.

"Where have you been?" retorted the foreman. "You were here when I came!"

Many suggestions stem from workers' gripes. At a Ford assembly plant, windshield workers complained that pounding the glass into place with their fists was ruining their golf game. Then one day Michael Bronik scooped up a handful of dum-dum, or flexible gum, sealer, formed it into the shape of a brick, covered it with plastic material and bound it up with masking tape. This new improvised mallet went over big. It eliminated the breakage that had resulted from rubber mallets and

(Continued to page 230)



Don't be stranded by a worn-out fan belt. Replace now with a Wizard extra-quality Fan Belt. Inner core of endless rubber impregnated rayon cords. Tough rubber cushion reduces heat, assures long life. Can't slip, stretch. Guaranteed fit. (T9105-9209) **65c up.**



More pep and power! Marvel Mystery Oil lubricates top piston cylinder rings, hydraulic valve lifters of late model cars. Makes starting easier. For both crankcase, gasoline tank. Ideal year-around additive. 4 oz. (A1315) **30c**, Pt. (A1316) **85c**, Qt. (A1317) **\$1.35**



Wizard Supreme Mufflers. Guaranteed leakproof, blowout-proof, efficient silencing, perfect fit. Built for long wear, minimum back pressure. Conform to original manufacturers' specifications. Gas-tight end caps. Fit most cars. (T1148-1586) **\$3.95 up.**

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NOTE: Western Auto Associate Dealers own their stores and set their own prices, terms and conditions. Prices may vary due to differences in local conditions. (PM52)



It's easy to repair brakes with Wizard Master and Wheel Cylinder Kits. Includes live rubber cups, boots; precision made valves, springs. For most cars, trucks. Master Cylinder Kits, less piston (55820-48) from **65c** Wheel Cyl. Kits (55905-28) from **35c**



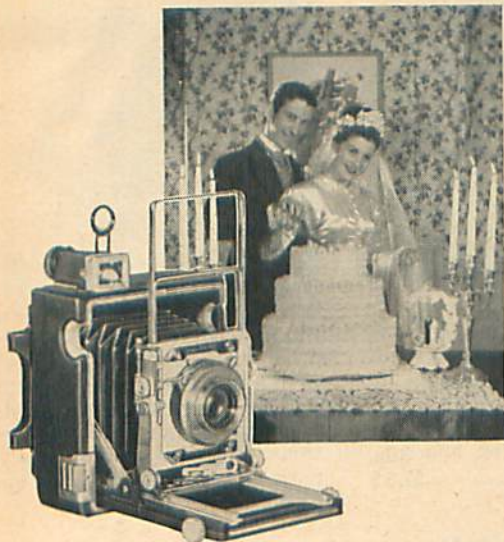
The one-step cleaner-polish! New Simoniz Bodysheen cleans and polishes, in one easy step. Just wipe on, then wipe it off! Brings out natural brilliance, enriches colors. Gives your car a long-lasting, weather-resistant finish. (DP7113) **98c**



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spared the golfers' hands. And it was worth \$1500 to the suggester.

Mittie Miller's idea was the outgrowth of a gripe against the grippers. A guide at the Alabama State Capitol in Montgomery, she won a cash award for the "best advice" to state employees: "If you don't like your job, quit and get another one."

Employees who click with their suggestions are pleasantly surprised that they can make so much money for so little work.

"It took me five minutes to figure out an improvement for a belt conveyor," explained Cesaire Balanger, a millwright at the Ford Motor Company's iron foundry in Dearborn, Mich. "I got \$1500 for my suggestion. This amounts to \$300 a minute, \$18,000 an hour, \$720,000 a week and more than \$37,000,000 a year. Even a Texan would find it hard to beat these figures! How long has this been going on anyway?"

As a matter of fact, suggestion systems in one form or another have been going on for quite awhile. A favorite theme on promotion posters shows Adam and Eve with an apple labeled "First Suggestion." The oldest suggestion system still in operation in the United States is that of the National Cash Register Company which dates back to 1894. One day when John H. Patterson, founder of the company, was walking through his plant, in Dayton, Ohio, he stopped to chat with an employee. During the talk, Patterson asked if there were anything in the plant the employee could see that should be changed.

"Lots of things," came the crisp reply, "but there's no use in making any suggestions. The foreman would take all the credit."

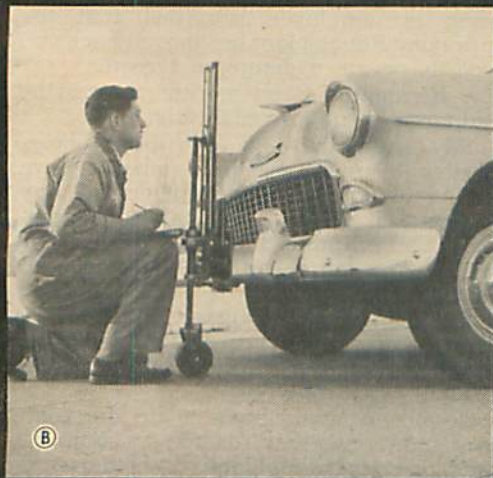
Patterson recalled something he had seen a few years earlier on a visit to Italy. It was a slot in the wall of the Doge's Palace in the Republic of Venice. Citizens dropped in notes suggesting improvements that should be made or corrections that were needed. Patterson decided to try the scheme in his own business. He placed small boxes in all departments and urged employees to drop in their ideas. Before long, other companies heard about the plan and gave it a try.

However, it was not until World War II that the suggestion box really came into its own. The War Production board put its official stamp of approval on the idea and it was adopted by plants all over the country. Today there are so many suggestion systems in operation that program administrators even have their own organization—the National Association of Suggestion Systems—whose sole purpose is to promote more and better suggestions.

(Continued to page 232)

"How we engineered
this new Chevrolet
for smoother going
and
'heads up' stops"

By Ed Cole, Chevrolet Chief Engineer



- A** Brutal Belgian-block roads condense years of wear into days.
B Special device measures amount of front-end "dive" under hard braking.
C Spherical-joint front suspension has only 4 grease points instead of 16.

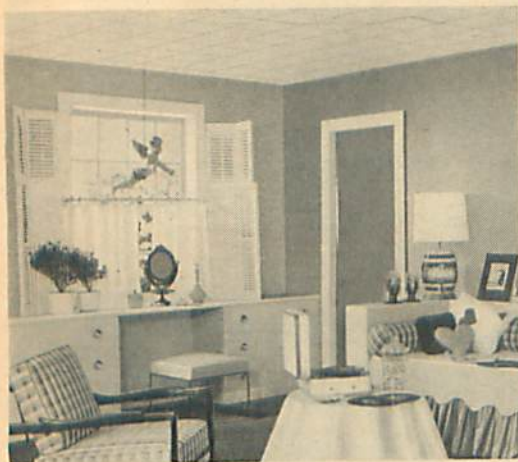
To give Chevrolet's new Glide-Ride front suspension its uncanny ability to sop up small, sharp road vibrations (as well as larger bumps) we had to create a really *free-flexing* unit. We completely eliminated all metal-to-metal friction so that the springs could react instantly to the smallest jolts. That's why the control arms are set in live rubber . . . and even the spherical joints themselves have non-metallic bearing inserts.

Spherical joints gave us other advantages—much less bearing area, so steering friction is minimized; reduced unsprung weight, so rid-

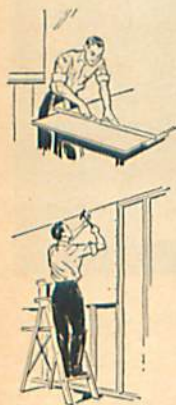
ing comfort is increased—and they also let us develop the exclusive Anti-Dive braking control, which drastically reduces that annoying nosing-down of the front end. There are scores of other advances in Chevrolet's new ride—but the *result* is what counts, and you can test that at your Chevrolet dealer's. . . . Chevrolet Division of General Motors, Detroit 2, Mich.



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Please send me a free copy of your Gold Bond booklet, with full application instructions.

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Besides producing money-saving ideas, the suggestion box has become a highly sensitive barometer of employee attitudes. This aspect seems to have particular appeal for the cartoonists. One of them drew a sketch of a little man with both hands jammed full of suggestion slips, proudly announcing: "Our employee relations are improving—only six suggestions this week that I drop dead!"

Actually, suggestions of the "drop dead" and "go soak your head" variety have all but disappeared. Most employees look upon suggestions as a serious business. Occasionally, though, a well-intentioned idea comes along that is good for a laugh.

The Boeing Airplane Company got a suggestion that Monday and Tuesday be designated as the regular days off—"because it always rains on Saturday and Sunday." And officials of the Ford Motor Company were somewhat taken aback when an employee proposed that the sprawling Rouge plant be "moved back one foot" to permit widening of a road.

A Remington Rand worker thought he had a real money saver in this one:

"My suggestion—off cut grass cheep. Costem to much gaslene — labor — lawn mower to expense. I think cheep we buy 2 goats \$15 apiece. Don't haf to buy gaslene. Can sell milk that be all profits. Big saving. No labor—no gas—no machine. Grass free for goats."

The suggestion committee, faithful to its "first commandment" of explaining why an idea is accepted or rejected, sent back this straight-faced reply:

"Someone would have to tie the goats to a stake until they ate the grass in one area. Then they would have to be moved to the next area. Someone would have to milk the goats and arrange for selling the milk. The goats would have to be placed under shelter each evening. Management feels that all this would be more expensive than running the gasoline mower." ★ ★ ★

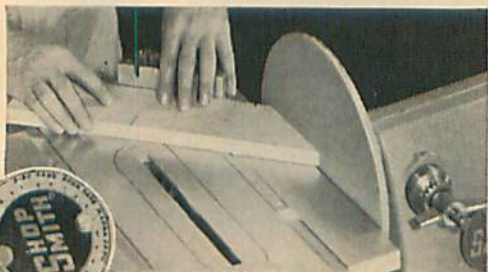
Portable Fluorescent



Powered by a small 110-volt battery, a portable fluorescent lamp has been developed recently in Germany. The lamp will burn for 12 to 14 hours on one battery charging. Recharging takes 15 hours.

The best tool for every job

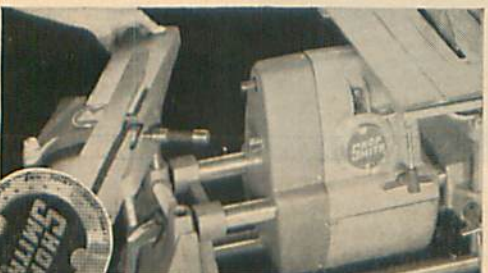
*and you can
dial them all
with SHOPSMITH**



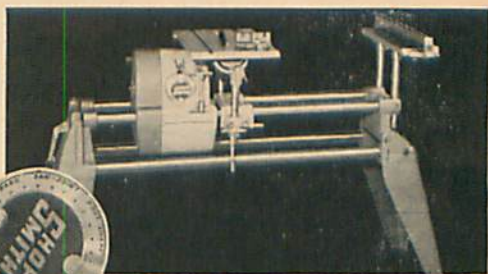
Sands! Correct speeds for coarse, medium, fine sanding of plastics, metal, all woods. Big 12" sanding disc. Depth control dial and built-in jigs for exact duplication of work.



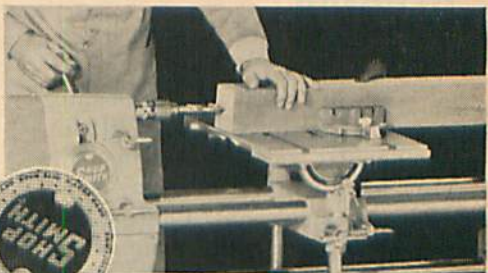
Drills! Speed settings (700 to 5200 r.p.m.) for every operation from heavy drilling to high-speed routing. Drills wood, metal, plastics to center of 1 1/2" circle. 58" chuck-to-floor. 26" chuck-to-table.



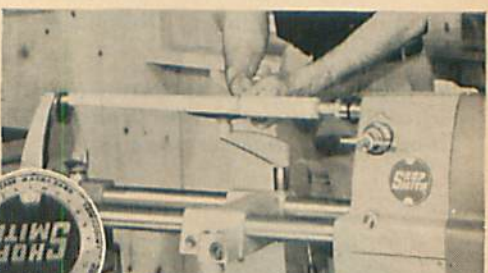
Exclusive POWER-MOUNT for quickly adding jigsaw, jointer, compressor. Another SHOPSMITH first! Add SHOPSMITH accessory tools with one twist of a handle. Power-Mount makes your SHOPSMITH a saw-jointer, jigsaw-sander, etc., with infinitely variable Speed-Dial settings.



Saws! Speed-Dial settings for precision cross-cutting, ripping, dadoing, molding. 9" circular saw. Big tilting table. 48" blade-to-fence. Cuts 2 1/2" lumber—even at 45 degrees.



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See the all-new SHOPSMITH demonstrated at your local hardware or Montgomery Ward store. It's America's largest selling stationary power tool complete with rugged 3/4-hp. motor, bench, chrome rust-proofing . . . **\$289.50** (Comparable individual power tools with benches and motors would cost \$600!)

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Dept. 294-B at factory nearest you:
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Menlo Park, Calif.

Please send me 2 FREE BOOKS—24-page booklet, "What to Look for When You Buy Power Tools," and 20-page illustrated SHOPSMITH catalog.

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*Easy to
Enjoy*

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Bronson "Flipper"

Now you can afford real spin fishing fun with a Bronson "Flipper"! It features popular manual pick-up—the fastest, easiest means to many hours of spinning enjoyment. Control your cast and retrieve with a flip of the finger. See the "Flipper" at your favorite sports shop, only \$4.95.

Other Bronson Spinning Reels from \$9.95 to \$17.95. Bronson Reel Company, Bronson, Michigan. Division of Higbie Mfg. Co.

Whatever your sport—spinning, bait casting, fly fishing—there's a Bronson-made reel to make it more fun!

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Combination A.C.-D.C. Welder

Alternating current and direct current are combined in a new arc welder. Controls permit the operator to select either a.c. or d.c. and either a soft or forceful arc. Thus the machine will produce the type of arc best suited for the job. The selection of current is made by turning a switch, and different output capacities of a.c. and d.c. can be combined. The machine permits the use of the new iron-powder-type electrodes which perform best with alternating current.

Automobile Polishing Mitt



Waxing and polishing cars is easier with a double-purpose polishing mitt. When paste wax is to be rubbed on, a piece of the wax is placed in a net pocket on the rubbing side of the mitt. After an area is waxed, the mitt is turned over so that the polishing side can be used to shine the surface. Both sides of the washable mitt have a soft, wool-like surface. It can also be used to polish furniture and clean windows.

☐ Fuel tanks of plastic are being mass-produced for the British Royal Air Force.

**Man with
stapler beats
man with
hammer 2 to 1**



...and cuts fastening costs 50%

What you see here is a race between a wood-working shop's two best cabinetmakers shown assembling haberdashery shelf dividers. One is doing the job the conventional way, with hammer, finishing nails and nail set. The other is using the new Bostitch T3 Air-Driven Tacker which drives and countersinks nail-type staples semi-automatically.

Results: staples beat nails better than 2 to 1, with cost savings amounting to 50%.

The Bostitch T3 won out on other counts, too. The shop foreman reports staples more accurately placed than nails. And each staple is neatly countersunk, its $\frac{3}{4}$ " legs pressing

outward in the wood to give greater holding power.

The new T3 is just one of 800 kinds of Bostitch staplers that cut costs all along the line in factories, shops, offices and stores. To help you pick the right staplers for your fastening jobs, Bostitch has 375 Economy Men in 123 cities in the U. S. and Canada—by far the largest and best-trained group of its kind.

Call in your nearest Bostitch Economy Man for a complete study of your fastening methods. There's no obligation. He'll tell you honestly whether stapling can save you money.

Look up "Bostitch" in your phone directory or write us.

**Fasten it better
and faster with**

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Is your radiator ready for Summer driving?

SUMMER—with hot weather, more driving, heavier traffic—puts a two-way strain on your car's cooling system. The cooling load is much heavier and heat multiplies the speed of rust and corrosion.

A clean system • To get good heat transfer the cooling system must be clean. Often the inside surfaces are coated with dirt, grease, rust or mineral scale. Sometimes there's enough sediment and rust to clog up some passages and part of the radiator section. If fan and pump are working right, a dirty system is the most likely cause of engine overheating.

Take out anti-freeze • Anti-freeze, too, increases overheating. In hot weather, it is important to remember that water can transfer more heat than anti-freeze solution does. Result? A combination of anti-freeze and a dirty system will cause enough overheating to cost you as much as 6 points in gasoline octane rating. Put another way, that means the equivalent loss of 1½ gallons of premium gasoline in every tankful.

Stop corrosion damage • Water alone will cause rust and corrosion. In Summer heat, water plus carbon dioxide, exhaust gases and other likely impurities can cause serious corrosion damage. The inhibitors in anti-freeze will protect you for the winter, but they may become exhausted and you can't depend upon them for Summer driving.

Expert advice • The Society of Automotive Engineers recommends, "Where anti-freeze has been used, drain the solution in the Spring; flush the system thoroughly and clean if necessary; then install a fresh filling of Summer rust inhibitor and water."

A message in behalf of your car engine from ...

OLIN MATHIESON
CHEMICAL CORPORATION

Automotive Products Department
Baltimore 3, Maryland

Makers of PYRO Radiator Chemicals
U.S.I. Permanent and Super Pyro® Anti-Freezes

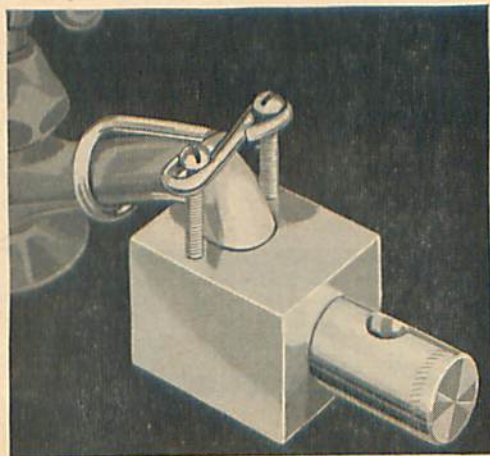


German Coffee Table

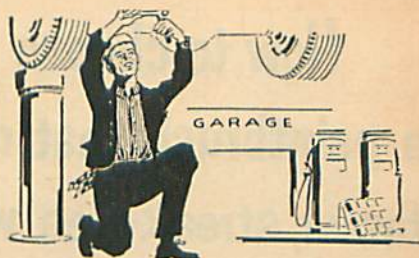
You can actually brew a pot of java on a German coffee table that has an electric hot plate built into its top. At the same time that it's heating the coffee, the table warms the people seated around it. Air heated by the hot plate is blown out on all sides by a fan situated beneath. The fan can also be used alone for ventilation.

Faucet Becomes Drinking Fountain

Any standard faucet can be converted into a drinking fountain with an attachment made of aluminum. Two screws and a spring clip hold the attachment in place. Water gushes up through a hole in the top of a cylinder which can be rotated to place the hole at the bottom, making it possible to use the unit either as a standard faucet or a drinking fountain.



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How to choose a paintbrush that does faster, streak-free work



Here's why it pays you to use a brush
with Du Pont TYNEX nylon bristles



1. No break-in! You don't have to soak or flex a new brush . . . if it has "Tynex" nylon bristles.



2. Full paint pickup! Specially tipped and flagged "Tynex" bristles hold a full load of paint.



3. Smooth, even flow! Anyone can do streak-free work, because each tapered "Tynex" bristle provides better, more even flow.



4. Easier to clean! They're the easiest-to-clean bristles there are! Paint loosens quickly in any commercial cleaner, rinses out thoroughly.



"Tynex" is the registered trade-mark for genuine Du Pont nylon bristles.

BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY

He's Changing the Face of the Earth

(Continued from page 84)

drawing boards in LeTourneau's factory at Longview, Tex.

Talking to people in the Longview plant, you suddenly see 30,000,000 acres of land in the South, now covered with trees and underbrush, blossoming into fine fertile farm land to help feed your grandchildren. You see weird mechanical monsters pushing back the jungles and forests of South America and Africa to make way for prosperous farms. At this moment behemoths born in the plant are carving out a highway in Peru and clearing a stepping stone at Liberia into the heart of Africa. And to LeTourneau, these monsters are just a start.

Take a look at some of his strange machines. When you see his land train you can't believe your eyes. It looks big; actually, it's bigger than it looks. It's a railroad without rails that will roll through jungles, over mountains and across deserts. LeTourneau figures his machines will be clearing some of the most inaccessible areas in the world. They must be serviced and their crews fed. He designed the land train to crawl over nothing more than a rough bulldozer trail, its freight cars hauling fuel, food and supplies. Despite its length and 250,000-pound weight, it can climb a steeper grade than an automobile.

The land train, including "locomotive" and seven cars, stretches out longer than a football field. Each of its 32 tires measures 6 feet in diameter and 30 inches across the tread. They keep the train from sinking in soft, boggy areas.

You climb a ladder to reach the towering cab of the locomotive. Inside are seven seats, deeply padded for a rough ride. Just behind the cab are two 500-horsepower diesel engines. This tremendous package of power is converted into electrical energy by direct-coupled generators. The fuel tank holds 3500 gallons—enough to keep the train rolling a long way in areas where there are no fuel stations.

Each of the seven 28-foot cars can carry 45,000 pounds of freight, making the total payload of the train 315,000 pounds. Car bodies will be designed to meet the needs of particular areas. Already on the drawing boards at the big Longview plant are unusual conceptions of flatcars, hopper cars, tank cars, refrigerator cars, passenger cars and other types.

Looking at the train, an engineer might describe it as an accomplished impossibility. How can one "locomotive" pull seven loaded cars across the roughest terrain without rails? How can you make the last

(Continued to page 240)

THE GREATEST INVENTION SINCE THE HAND SAW . . .

New **AMF** DeWalt "Power Shop" brings out the expert in you!

Today, AMF DeWalt® "Power Shop" is everywhere known and accepted as the one really safe, accurate, easy-to-use machine. It's so designed that even the inexperienced can *expertly* do everything in home woodworking.

Whether you're modernizing, decorating or repairing your home, AMF DeWalt is your best investment. See it demonstrated today. At your DeWalt Dealer's or fine hardware and department stores.

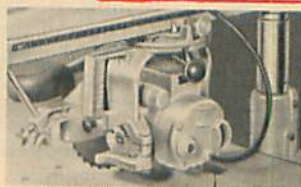


\$239.00 delivered
(saw blade and custom-built 1/2 H. P. motor included).
EASY TERMS.

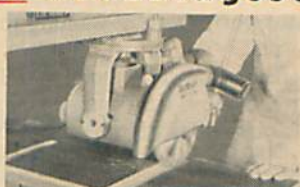
All these exclusive extra-value advantages!



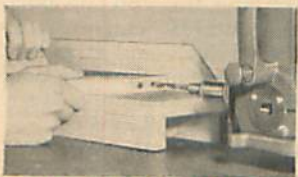
TOP-SIDE CUTTING! No guesswork—no mistakes. You always see the cut because layout marks are visible and easy to follow.



PROFESSIONAL ACCURACY! Calibrated scales for miter, bevel and rip are visible above table. Instantaneous settings!



EASY TO USE! You control ball-bearing travel head in radial arm. Moves smoothly, precisely. All cuts perfect—no spoilage.



COMPLETE VERSATILITY! One powerful direct-drive motor accommodates any circular tool—gives full home workshop flexibility.



NO FLOOR SPACE NEEDED! Builds into your workbench! When not in use radial arm swings conveniently out of way, freeing work area.



HOME SAFETY FEATURES! "Stop" red controls, UL* approved motor, safety key switch, auto-float safety guard (optional).

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*Stopping too often for gas shows
your power is fading... and it's
time to replace your Piston Rings!*

Having to buy too much oil and gas, and slow pickup reveal POWER FADE! Your rings are badly worn—you're wasting money on lost power.

Top performance is gone. And despite the extra oil used, vital engine parts remain starved for oil. This is not only costly and wasteful, but is a warning of expensive repairs to come later.

See your motor specialist for a ring check-up. If he recommends a ring change, it will pay you to install Hastings replacement rings. They're engineered exclusively for worn engines to quickly stop power fade, oil-pumping and gasoline waste.

All the safety and driving enjoyment of full-powered performance are yours again with Hastings Rings... it's the best money you can spend on your car.

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HASTINGS

STEEL-VENT PISTON RINGS

Regular or Chrome-Faced

* TOUGH on oil-pumping • GENTLE on cylinder Walls

cars, about 300 feet from the driver, "track" so they won't leave the trail?

LeTourneau solved the power problem by giving the train 32-wheel drive. Electric power flows from the generator to each wheel on the train. Inside the wheel is an electric motor. Thus each car is a locomotive in itself, not only carrying its own load but pushing the car in front of it and pulling the one behind. And the matter of tracking is solved by an ingenious linkage between the cars, which turns each car at precisely the proper moment and just the right amount to make it follow the path of the preceding car.

One day, just to prove the tracking ability of the train, LeTourneau engineers ran it down the main streets of Longview without any preliminary fanfare. Cars were parked along both curbs and startled motorists were in the traffic lanes, yet the train rolled around right-angle turns without scratching a fender.

If you've ever seen huge trees torn out of the ground, roots and all, by a tornado, then you have some idea of the strength of another LeTourneau machine, which he calls a "tree stinger." This lumbering giant has one of the strongest "shoulders" ever built. It rolls up to a huge tree, leans against it, and down goes the tree. The purpose of the machine is to reach out into inaccessible places and push over trees up to six feet in diameter without cutting them. The operator rumbles up within reach of the tree and drops the stinger's rear-mounted bulldozer blade to anchor the machine. Then he pushes out a 35-foot boom toward the tree. The boom terminates in wicked teeth which bite into the tree 15 or 20 feet above the ground. Then, giving the big engine the gun, he pushes the boom farther out. He can push it to a total length of 65 feet, and it exerts a thrust of 250,000 pounds on the tree. Something has to give and eventually it's the tree which topples in defeat.

But there are trees too large or strong for even the stinger to handle. LeTourneau's tree saw is probably the largest one ever built. It has a long boom extending more than 16 feet in front of it. This boom not only extends, but moves sideways. Just beneath the end of the boom is the ugly blade of the saw, which can be dropped down to ground level if desired. Various blade sizes are available, but the whopper is one 10 feet in diameter with teeth 5 inches deep. Spinning at 720 revolutions per minute, the blade seems to melt right through large trees. Meanwhile the operator wields the huge overhead boom like a baton to force the tree to topple in any

(Continued to page 242)



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Give distinctive beauty to your porch, carport, patio, entranceway. Use economical, ready-to-install TFC Ornamental Cast and Wrought Iron. Many traditional and modern patterns in columns, railings, brackets—everything you need to do an expert job.



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TFC Ornamental Iron is designed for quick, easy installation by anyone who can use simple hand tools. Mail coupon today for information and ideas you can use to add new beauty to your home this easy way.

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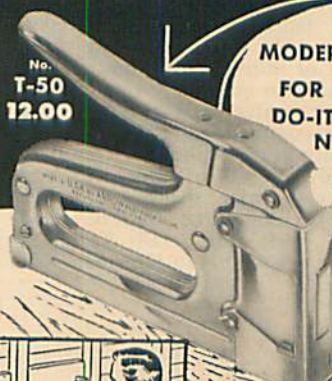
SAVE 1/2 on WATER SKIS

\$15³⁰



Simply assemble and finish our new water ski kit and you have a pair of skis worth twice the price of the kit. Skis are 7 ply moulded plywood, 67½" long, 7" wide, 9/16" thick. Sturdy rubber foot pieces. All parts plus instructions included—\$15.30. Order from your Michigan dealer or MICHIGAN WHEEL CO., Dept. P-95, Grand Rapids, Mich. C.O.D. orders accepted.

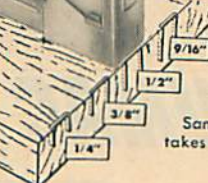
AMAZING... VERSATILE ARROW GUN TACKER



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MODERN METHOD
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DO-IT-YOURSELF
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**FASTER!
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Same machine
takes all 4 sizes.

The most sensational tool ever devised for fastening insulation, ceiling tile, screens, cornices, linings, etc. Self-feeding, automatic action permits user to staple-tack at desired rate of speed. One-hand operation frees other hand to hold material in place. It all adds up to savings of time, money and effort. Sold at Hardware, Building and Lumber Material Dealers.

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The Flatfish Makes An Amateur An Expert

The Flatfish enables even an amateur fisherman to be an expert because of its extremely lifelike motion which fools a fish into striking. That's why it is something special. World's largest selling plug. Over 14,000,000 sold. Get it at your tackle dealer's or write for 48-page book with fishing secrets of famous anglers.

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the *GLUMAC* way!



It **PAYS** you to beautify your home with these factory-stained cedar shakes.

- **DO IT YOURSELF**, in any weather
- **SEAL OUT COLD**, seal in heat
- **REDUCE MAINTENANCE**, upkeep
- **INCREASE RESALE VALUE**

You can do wonders with these big, easy-to-handle units of famous Shakertown cedar shakes. They save 2/3 on application time. There's no fitting of individual shakes, no finishing. Colored nails to match are included in each carton. Just 22 units 16" x 46-3/4" cover 100 sq. ft. at recommended 14" exposure. Glumacs need only finish nailing to complete a "double-coursed" sidewall of tapered backer-board and grooved cedar shakes. Whether you're building or remodelling, you'll be ahead with GLUMACS! Write for details TODAY. The Perma Products Co., 20310 Kinsman Rd., Cleveland 22, Ohio.

Shakertown

GLUMAC UNITS

FACTORY
STAINED
CEDAR
SHAKES



direction he desires, piling up big windrows.

Though the stinger and saw are huge and spectacular, they are midjets compared to the most startling of all LeTourneau machines—the tree roller. This 110-ton behemoth flattens a forest as flat as one of Paul Bunyan's legendary pancakes. The machine looks like some gigantic caricature of a bicycle. Two rollers, back and front, are connected by a long tubular framework. Each of the rollers is 8 feet high and 20 feet wide. Studded around the outside of the rollers are 320 blades, shaped much like ax blades. From his perch high on the relentless mammoth the operator simply drives the machine across the area to be cleared, rolling right over trees and underbrush. When the front roller comes up against a big tree—up to four feet in diameter—it climbs right up the trunk until it has gained enough leverage to knock it over. As the tree comes down with a crash the ax blades bite into the wood and the weight of the machine literally grinds the tree into kindling. The operator keeps rolling in an ever-decreasing spiral until he reaches the center of the area, and from this hub he can survey an area of unbelievable destruction. Weeks or months later the crew can return and burn off the entire area, the ashes fertilizing the soil which then is ready to plow.

To handle merchantable lumber and for general utility work, LeTourneau has engineered a line of cranes. The jackknife crane is an ungainly monster that reaches out its long neck, grabs a huge log in its mouth and lifts it as though it were a matchstick. Another crane has a revolving turret. It can move into a forest, reach out and pick up big logs with its 30-foot boom, then whirl around and load them in its hip pocket as it rolls out of the timber. It can lift 25 tons of dead weight.

Even though he has plunged into the land-clearing business in a big way, LeTourneau has no intention of restricting himself to this field. One of the weirdest vehicles ever made now is roaming the arctic wastes. It's the "Sno-Buggy," and at first sight it looks like tires surrounding nothing but more tires. LeTourneau designed the vehicle so a huge area of rubber would be in contact with the fluffy snow, literally "floating" the machine and its cargo on the surface. The 8 rubber tires are the largest ever built, each of them 10 feet high and 4 feet wide. They are mounted on the vehicle dual-fashion with the cab nestling right in the middle. The resulting Sno-Buggy is 24 feet wide, 27½ feet long and weighs 23 tons. There's a 16-foot width of rubber in contact with the snow both

(Continued on page 244)

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HEADACHE
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FAST



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Anacin® is like a doctor's prescription. That is, Anacin contains not one but a combination of medically proved active ingredients. Anacin is specially compounded to give **FAST, LONG LASTING** relief. Don't wait. Buy Anacin today.



MAGNETS **225 lb. PULL**
GENUINE ALNICO—NEVER WEAKENS

AMAZING, PERMANENT MAGNETS—WILL NOT WEAKEN! NON-ELECTRIC
Retrieve guns, tackle, tools and other steel items from lake, river, plating tanks, drains or other hard-to-reach spots. Recover drills, taps, etc. from sweepings. Clear alley of harmful tacks, nails. Many other uses. Pays for itself quickly. **GUARANTEED.** Try any magnet one week. Money refunded if you are not well pleased.

No. M-725 (Weights 54 oz.) Has pull of 225 lbs. on steel block. \$15.00
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Send Money Order or Check. We pay postage. No C.O.D.'s.

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**CUT RADIO CHASSIS HOLES
IN 1-1/2 MINUTES OR LESS**

Quickly make accurate round, square, key, or "D" openings... in metal, bakelite or hard rubber... with GREENLEE Radio Chassis Punches. Simply turn with a wrench.

Many sizes. Write for details. Greenlee Tool Co., 2105 Columbia Avenue, Rockford, Illinois.



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Makes tough jobs easy!

3 Models—1 1/2-2 1/2-3 1/2 HP.

Tiller, mower, snow blow attachments easily shifted. Safe and easy to operate. Rugged steel frame, adjustable rubber tired wheels. So handy around the home or farm!

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Tills,
Cuts Grass,
Blows Snow!



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NEW KIND OF HAMMER

Head won't loosen; shaft won't break

R-R-R-RIP—pulling heavy nails won't bend or break the handle of the **ROCKET** hammer—it's a tube of boron alloy steel. The head is locked to the shaft—can't fly off, can't even *loosen*.

WHAM—when the hammer hits a nail, the hollow shaft and rubber cushion grip soak up the shock. It's the best-feeling hammer you ever swung and perfectly balanced, too.

Cushion grip won't slip even when wet or in gloved hand. It's bonded permanently to the shaft. See the **ROCKET** at your hardware store. \$4.35*. Write for free folder. True Temper Corp., 1623 Euclid Ave., Cleveland 15, Ohio.

* Slightly higher in West

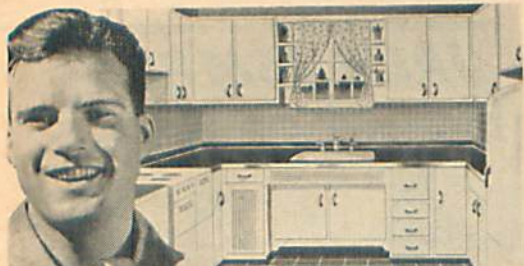
Carpenter's Apron **PROFESSIONAL QUALITY** **Only 39¢**



Select a True Temper hammer and get this carpenter's apron for only 39¢. High-quality duck. Chart shows nail sizes. Practical, snappy. Limited offer, get yours now at your hardware store.

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**"My Black & Decker Saw
more than paid
for itself in
modernizing
our kitchen!"**

**B&D 6" Heavy-Duty
Adjustable Saw \$64.50**



My B&D Saw saved me all the back-breaking labor of hand sawing. And it cut really straight—I could see the blade follow the line.



Even cutting the hole for the sink was easy—and safe—thanks to the lift-lever on the blade guard.

Send for your copies of the Easi-Bild* Kitchen Cabinets pattern and Black & Decker's "Handy Tips" booklet. Use coupon below.



B&D 6 inch Heavy-Duty Saw—a professional tool at a popular price! Features a specially-designed, better-built B&D motor that cuts wood like butter; instant-release trigger-switch and telescoping blade guard with lift-lever for safety. Cuts 2 inches deep, adjustable from 0° to 45°. At hardware, lumber & department stores.

See "Tools-Electric" in phone directory for



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PORTABLE ELECTRIC TOOLS

The Black & Decker Mfg. Co., Dept. M055, Towson 4, Md.

Gentlemen: Please send me

☐ Kitchen Cabinets Pattern #201 (price: \$1.00)

☐ "Handy Tips" booklet (price: 25¢)

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front and rear. But can 23 tons be supported in soft snow? The answer was apparent recently when the Sno-Buggy, under test by the Army, rumbled through its paces in the Arctic. It squished effortlessly across the soft snow. The machine promises to be equally effective in soft desert sands and swampy areas.

Perhaps the most publicized of all the machines is the \$160,000 house mover, which can pick up a multistory house weighing up to 150 tons and move it to a new location. The huge U-shaped machine has a built-in tractor. It is mounted on nine-foot tires, each costing \$6000. The frame is backed up until it surrounds the house. After suitable beams are installed beneath the home, the Tournamover hoists the house right off its foundation. The mover then rolls to the new location where the house is deposited on a new foundation. The entire operation can be done without removing a cup or saucer from the home.

In another version, the machine is a "house layer." At a central casting site, concrete is poured into a form to make a one-piece house. When the concrete has set, the machine lifts the house, form and all, and trundles away to the homesite. There it releases the house from the form and carries the form back to the casting site to hatch another home.

The heart of all the machines is the "electric wheel." Inside the broad rim of the wheel is a high-torque motor, geared to deliver immediate power in either direction. Thus each wheel drives, has its own brakes and can be steered. It is a prime mover that delivers controllable power without any transmission, torque converter or clutch.

To test his machines, LeTourneau has acquired vast tracts of land in Liberia and Peru. In Liberia his monsters are clearing the jungles for use by the natives as farm sites. In Peru, engineers and machine operators are building a 31-mile highway through dense jungle in the Amazon basin. In return, the Peruvian government has granted LeTourneau 400,000 hectares (nearly 1,000,000 acres) of land for a colonization project. After the area has served as a testing ground and a show place for his machines, LeTourneau will sell the land to Peruvian colonists.

So far in these wild, dense jungles, LeTourneau hasn't found anything his lumbering machines can't cut off, beat down or roll over. In the unlikely event that he ever does find such an obstacle, he'll very likely conquer it by designing an even larger machine with still higher wheels. He thinks big—the way his ungainly monsters perform. ★ ★ ★

CAR

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DISTANCE

25,000 Miles

TIME

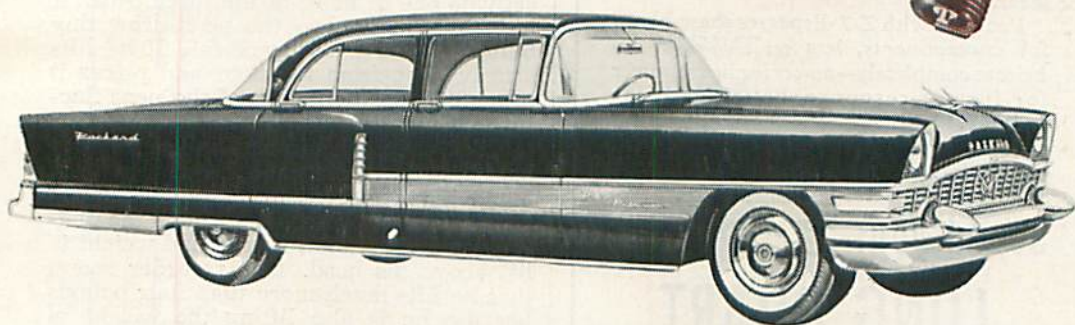
238 Hours, 41 Min.

SPEED

104.73 M.P.H. Average

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A Packard Sedan powered by a pre-production 1955 Packard Patrician engine and equipped with regular 5-Rib Champion Spark Plugs made automotive history in this 25,000-mile endurance test supervised by the AAA.

Its dependable Champions functioned perfectly as the car covered a distance greater than the earth's circumference at an average of 104.73 m.p.h.—one of the most remarkable performance runs ever made by a motorcar.

MORE PROOF that full-firing Champions and top performance are a natural combination in *any* car. **MORE REASON** you should make the change to Champions—soon!

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Learn a lesson from a rusty reel!

Keep your car's engine clean and free-running to UNLOCK HORSEPOWER

Few men will let a reel rust or corrode to where it causes backlash. Yet many let the same thing happen to their car engines. For, like rust on a reel, engine deposits cause friction that binds vital parts—steals power, wastes gasoline, promotes costly wear.

Pennzoil with Z-7 disperses these harmful contaminants, lets *THE Tough-Film*® lubricate completely—unlocking horsepower for instant response, better gasoline mileage.

For summer, change to Pennzoil with Z-7 and feel the difference!

Sound your **Z** for the
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Why Do You Get Tired?

(Continued from page 106)

have always calculated the work performed from the standpoint of its effects on the bag. Brouha jumps the fence to learn the effects on the man. He measures total work, not just useful work.

The Lauru platform is so sensitive it can measure the energy a rat puts forth in running across it. If you sit motionless on the platform the instrument will show your pulse beat. Triangular in shape, the platform is built up of three layers. Between layers and at the points of the triangle are extremely sensitive piezoelectric crystals. Under pressure these crystals give off tiny electrical impulses. The three layers measure vertical movement, side-to-side movement and front-to-back movement. Thus the platform will record the force necessary to produce a movement in any direction.

The crystals are linked through an amplifier to the recorder. Results show up on a sheet of graph paper that rolls along under three moving pens. Each pen shows movement in one of the three directions. A subject is placed on the platform with the tools he needs to perform his job. The platform then is "zeroed" to make him weightless, so any motion he makes will activate one or more of the three pens. If he stands motionless the pens draw tiny bumps showing his heartbeat. If he lifts a heavy bag from the floor and places it in another position, each of the pens fluctuates violently.

"Most people fail to realize," says Brouha, "that they perform a lot of work just in moving themselves in addition to moving their work. We place a person on the platform and give him a four-pound weight to lift above his head. The recorder shows that he lifts much more than four pounds because he is also lifting the weight of his own arm. Furthermore, a great deal of energy is spent in stopping a moving object, even if the movement is upward. For example, a poorly coordinated man can actually spend more energy in stopping the upward motion of a weight than he did in starting it upward in the first place."

During its "break in" period the platform turned up some surprising facts about ordinary chores. A man painted a ceiling from the platform. He was followed by a woman who ironed a shirt. The graph showed (and hush this up, men) that the woman was putting forth twice as much work as the man. In case this information reaches your wife, you can come back with another surprising fact: A stenographer, in filing papers in a four-drawer cabinet,

(Continued to page 248)

NOW! Put up Plywood Panels Without Nails!

It's a revolutionary construction technique! Made possible by a new adhesive...Weldwood Contact Cement! Lets you put up plywood with ease. Ends nail-setting and puttying. No finishing unsightly nailholes. You install the plywood panels directly to studs or furring strips. Makes pre-finished plywood paneling more practical than ever before!

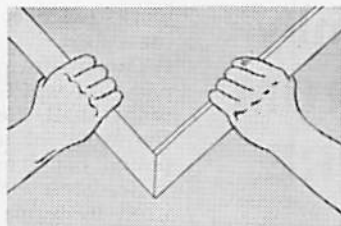


Weldwood Contact Cement bonds instantly without clamps or presses. 1001 uses in every home, shop, garage. For bonding wood, aluminum and other metals, cloth, felt, paper, leather, fiberglass, rubber. Wonderful for applying Micarta — without clamps or presses.

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When your job demands professional results...or where water-resistance is important...use the glue that professional cabinetmakers love to use...Weldwood Plastic Resin Glue. It's just about the best wood glue there is! Actually makes glued joints stronger than the wood itself! Grows even stronger with age. Highly water-resistant, stain and rot-proof. Spreads smoothly and easily. A little goes a long way. Where quality counts most, there's no substitute for Weldwood Plastic Resin Glue — deservedly America's largest selling wood glue.



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Weldwood® Glues...Satinlac® Firzite® are available at all hardware, lumber and paint dealers.

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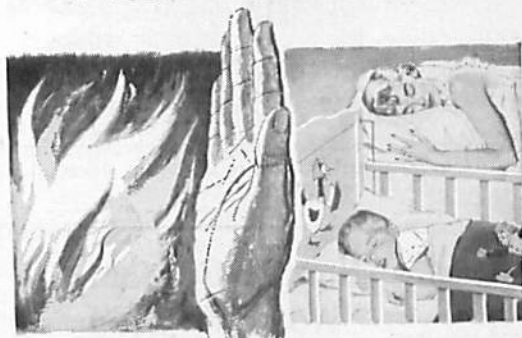
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works twice as hard as the housewife ironing a shirt.

The platform shows that you can do a passel of work just "relaxing." Serving a tennis ball, for example, requires twice the work of hoisting and moving a 50-pound bag from one position to another.

Research with the Luru platform, measured in terms of pounds, shows that a mason puts forth 61.6 pounds of effort to pick up a trowel of mortar and a brick. Raising your arms above your head and lowering them takes 62.5 pounds. A soldier expends 276 pounds of energy doing a quick deep kneebend and, to the amazement of the research workers, he uses less than that to straighten up. In this type of measurement even a piece of paper can be heavy; an office worker spends 15.4 pounds just picking up a sheet from the lower drawer of a desk.

Such research isn't just theoretical. Luru ran an experiment on labor of a bricklayer. The man stood on the platform with a pile of bricks and some mortar at his feet. When he started laying up a wall the three needles waved all over the graph paper. Luru, by the simple expedient of placing the bricks and mortar on a scaffold at waist level, evened out the needle lines into gentle curves—a tremendous saving in energy.

Eventually Brouha and his staff hope to analyze a good many of the ordinary jobs of DuPont workers as well as others. They'll watch the motion of the pens and come up with specific recommendations for modifying jobs to eliminate wasted effort and fatigue.

The platform may also become a valuable tool for fitting a man to a particular job. No two men, placed on the platform, do a job in exactly the same way. The fewer and smaller the wiggles on the graph, the better suited is the man for the job.

Research with the platform is just one of several ways that Brouha is pinning down the causes of fatigue. He also is determining the effect that temperature, humidity and clothing have on workers in specific jobs, and discovering physical reactions that can signal the approach of fatigue.

If you peek through the observation window into one of the two all-weather rooms at Haskell during an experiment, you'll see a startling sight. Pumping away at the pedals of a bicycle (without going anywhere) is a man literally covered with instruments. One of his arms, suspended in a sling above the handle bars, is wrapped with a band that takes a continual reading of his blood pressure. A clamp over his

(Continued to page 250)

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nose forces him to exhale through his mouth into a tube. The expired air flows through instruments which measure the amount of oxygen he has extracted and the amount of carbon dioxide he is exhaling.

Thermocouples strapped to various parts of his body measure his temperature, and other instruments record the amount of perspiration on his skin. Every 15 minutes Doctor Brouha rushes into the room and draws from the subject's arm a sample of blood, which is immediately checked for changes in blood chemistry. As you stand in the observation room you sense a background rhythm—the continual boom boom boom of the subject's heart, broadcast through a loudspeaker.

Paul Smith, Chief of the Physics Section at Haskell, designed much of this equipment. "Our goal," he says, "is to measure the most important stresses inside the man's body. We want to know exactly how a man's 'working level' differs from his 'resting level.' Our volunteers sometimes work almost to exhaustion while we make comprehensive tests on them."

Volunteers, all laboratory technicians, go through this routine three times at three different levels of temperature and humidity. Few are able to finish a sprint with the temperature and humidity both high.

After the subject has been pedaling for some time, Brouha will tell you to watch two pen lines on a recording graph. "If the two lines meet, the subject will stop through sheer exhaustion," he says. Sure enough, just as the lines come together the subject stops pedaling and shakes his head to signify that he can pedal no more.

Of what value is such research? By finding out exactly what goes on inside a man's body while he works, Brouha hopes to pin down the exact causes of stress and to show employers how they can eliminate those causes and still get the work done.

One simple and excellent index of fatigue is the heart-recovery rate. At the end of a given work period, a worker is told to sit motionless while his pulse rate is taken at one-minute intervals for three minutes. Ideally, at the end of the third measurement the rate should be back to normal. But in jobs which require too great an expenditure of energy, the heartbeat rate stays very high even on the third count. The normal rate, though it varies widely, is about 72 beats per minute. A rate of 150 after three minutes of recovery indicates fatigue with the possibility of exhaustion.

Another check is the worker's temperature, which may slowly rise to a high of 101 or even 102 degrees toward the end of a hard day's work. Brouha now can tell

(Continued to page 252)

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when a worker is overtaxed to such a point that if he continues, he'll slide down the hill to utter exhaustion.

Brouha's research with heart-recovery rates and temperatures among workers of the Aluminum Company of Canada, Ltd., before he joined DuPont, has enabled him to pin down a very definite "gripe line" on his graphs. When any worker's heart-recovery rate stays at 110 beats per minute at the end of the first minute following work, he invariably begins griping to anyone and everyone about his job—and with good reason, for he is well on his way to fatigue.

Heat and humidity have a tremendous effect on fatigue. In any type of physical work, the higher the temperature above 40 degrees Fahrenheit the greater the stress on the worker. In one experiment, a manufacturing plant was kept at a temperature of 40 degrees and workers were able to perform 11 full cycles of work without showing any high reactions. Later the same work was performed by the same group at a temperature of 82 degrees and, even though rest periods were frequent, the men were unable to perform more than eight cycles of work. Furthermore, tests showed that they were rapidly approaching the danger point in fatigue.

This temperature-humidity research has led to the development of an air-cooled suit designed for hot, humid work. A flexible tube runs into the suit. Smaller tubes branch off to the arms and legs from this main artery. They have holes about one inch apart. The large tube is connected to a source of compressed air which blows through the tubes, emerges through the holes, balloons out the suit and escapes through the material itself and around the neckband.

In one test with the suit, a man rode the bicycle in the all-weather room with the temperature at 110 degrees and the relative humidity at 65 percent. After 30 minutes of pedaling, his heart-recovery rate was excellent. Then the air to the suit was cut off. Even though he remained motionless, his pulse rate shot up from 108 to 130 beats per minute. He was instructed to go back to work without the air supply, and his pulse rate skyrocketed to 162 beats per minute. At that point he became so dizzy he almost fell off the bicycle.

The suit is one development from the research at Haskell, but more important are the hundreds of graphs and the thousands of calculations that are piling up day by day. Fact upon fact is filed neatly away in cabinets, and from these cabinets may come techniques that will help eliminate fatigue. ★ ★ ★

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Building the Test House

The test house pictured above was built in eastern Pennsylvania by the author and his wife, neither of whom had any previous building experience. It is a year 'round home, insulated, modern heating and plumbing, fireplace, redwood interior finish, dozens of built-in features and floor-to-ceiling, 9-foot wide picture window. Total man hours required to build—1650. Total cost not including ground and inexpensive foundation—\$3731.23



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Overall size 24 x 46 feet. Note the two typical floor plans shown. Above: Two bedrooms, bath, kitchen, dining room, living room, car port or porch. Below: Three bedrooms, bath, utility room, kitchen, dining area, living room, porch. The "Precut House" book shows many other variations.

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Body Style and the V8 Engine Rate High With Pontiac Owners

(Continued from page 122)

surface for amount of heat. Too much cooling-water capacity to make heater effective."—Michigan railroad engineer.

"Cooling system is too big. Takes forever to heat up to where it is comfortable riding. Takes about 10 miles."—Colorado clerk.

"The ash tray could be located in a better place. It interferes with the steering wheel."—Michigan tool and die worker.

1955 PONTIAC SPECIFICATIONS

ENGINE

Type	Overhead-valve V8
Bore and stroke	3.75 x 3.25 in.
Piston displacement	287.2 cu. in.
Brake horsepower	180 at 4600 r.p.m.
Compression ratio	8.0 to 1
Transmission	3-speed conventional. Hydra-Matic optional at extra cost.

GENERAL

	CHIEFTAIN	STAR CHIEF
Wheelbase	122 in.	124 in.
Tread, front	58.65 in.	58.65 in.
Tread, rear	59.05 in.	59.05 in.
Weight, unladen	3501 lb.	3546 lb.
Turning-circle diameter	42.5 ft.	43.0 ft.
Steering wheel turns, lock to lock	5.06	5.06
Length over-all	203.2 in.	210.2 in.
Width over-all	75.4 in.	75.4 in.
Height over-all	60.5 in.	60.5 in.
Road clearance	7.68 in.	7.68 in.

CAPACITIES

Gasoline	20 gal.
Oil	5 qt.
Water	24 qt. (without heater)

INTERIOR DIMENSIONS (4-door sedan)

Front hiproom	61.8 in.
Rear hiproom	63.1 in.
Front headroom	35.6 in.
Rear headroom	35.9 in.
Front legroom	42.7 in.
Rear legroom	42.8 in.

"I would like two ash trays in front and the cigarette lighter located nearer driver."—Michigan buyer.

However, not all agree. For example, a worker in a Detroit automobile factory wrote:

"The ash tray is at last in a position for the driver to reach it without distraction."

Here are a few other changes that the owners would like to have Pontiac make:

"Raise roof slightly. Doors too low for both men and women with hats on."—Georgia railroad conductor.

"Relocate headlight switch. Being tall, I have kicked them off accidentally with my knee while driving at night."—Kansas farmer.

"Rear-view mirror obstructs forward vision at intersections in certain directions

(Continued to page 256)

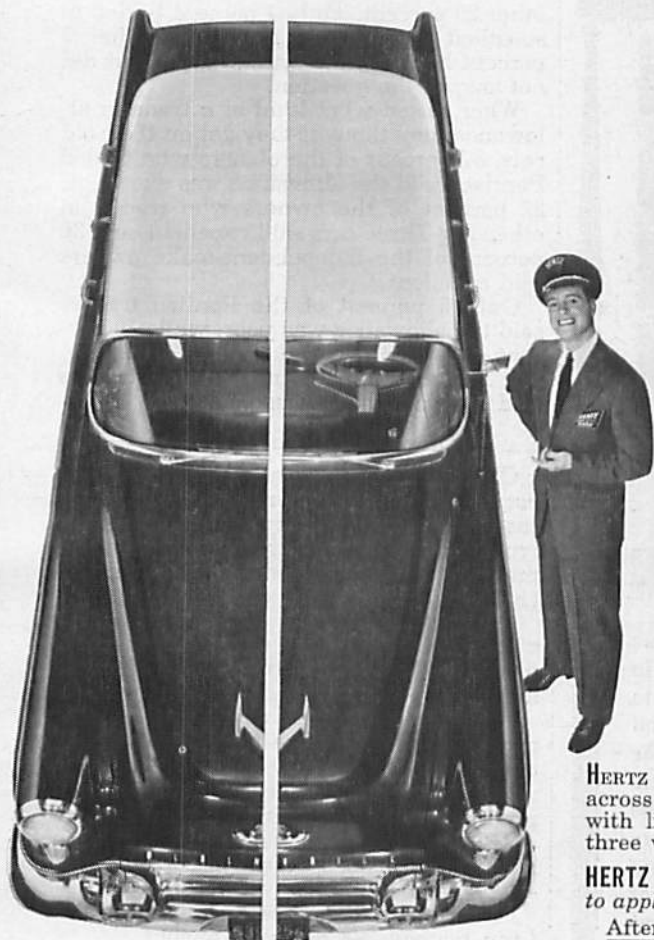
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HERTZ picked 20 of its rental cars in cities across the U.S. One side of each was waxed with liquid Car-Plate, the other with one of three well-known paste waxes.

HERTZ FOUND: Car-Plate is far faster, easier to apply than any paste auto wax.

After months on the road, the sides were compared for wear and shine.

HERTZ FOUND: Car-Plate lasts as long as the most durable paste auto wax.

The reason: All the Car-Plate wax stays on your car—you don't rub wax off as when polishing paste wax. The Hertz test car shown here was driven 3 months, then simply washed and photographed. If you can't tell the Car-Plate side (right) from the paste side, why waste hours rubbing? Next time wax with Car-Plate!



Before waxing use Car-Plate Cleaner. Wax will bond perfectly in a brilliant, long-lasting finish.



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EXTRA FINE for finest filing



With Nicholson X.F. Swiss Pattern files, fine work comes *naturally*. They are made in seven degrees of fineness, from No. 00 to superfine No. 6; and in scores of shapes and sizes. Thus you can be sure of precisely *The right file for the job*. Made to extremely exacting measurements, Nicholson X.F. Swiss Pattern files are the choice of industry wherever fine metal shaping and finishing must be done. They are the choice, too, of experienced hobbyists who demand the best in tools for the best results. *Available at good hardware stores.*

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(In Canada: Nicholson File Company of Canada Ltd., Port Hope, Ontario)

NICHOLSON FILES

FOR EVERY PURPOSE

for men six feet tall. Also front seat does not go back far enough for tall men."—Washington federal employee.

What Make Did They Trade?

As you might expect, most of the 1955 Pontiac owners traded in Pontiacs—60 percent of them, to be exact. Other cars produced by the Big Three (General Motors, Ford and Chrysler) accounted for another 29 percent. Only 4 percent traded in so-called independent makes. Another 5 percent had no trade-in and 2 percent did not answer the question.

When asked what kind of a trade-in allowance they thought they got on their old cars, 37 percent of the owners who traded Pontiacs said the allowance was excellent; 22 percent of the owners who traded in other Big Three cars said excellent, and 36 percent of the independent-make owners said excellent.

Only 5 percent of the Pontiac traders said the allowance was poor, while 10 percent of the Big-Three traders said poor, and 18 percent of the independent traders said their allowance was poor.

More Best-Liked Features

Close behind engine performance on the list of best-liked features come handling ease and riding quality. Here are some typical quotations of owners as they wrote the best-liked feature on the questionnaire (in order of frequency of mention):

"It is very easy to handle, especially when parking. I thought power steering would be bad on ice, but I have changed my mind."—Rhode Island jewelry worker.

"Handles very well at all speeds, and especially above 70."—New Jersey truck driver.

"Car steering is so easy, even without power steering."—Kansas plumber.

"Riding comfort is very good. My wife always falls asleep—that's proof enough."—Michigan oil-company employee.

"Front-seat comfort is fine. Back seat a little bouncy."—Colorado rancher.

"I like best the ability to see all four corners of the car from the driver's seat. This makes parking easy."—Illinois bookkeeper.

"Holds the road wonderfully. When making turns it doesn't throw you from side to side."—Illinois circulation manager.

"At all speeds up to 80 miles per hour, it seems to stick to the road as if glued. Never owned a car before that was as good as this one for roadability."—Massachusetts radio technician.

"Interior is well made. Dash set up very well, except for cigarette lighter."—Illinois machinist.

(Continued to page 258)

**SHOP by MAIL and
SAVE at GROBAN'S**

SURPLUS SALE

ALL ITEMS Brand New!

BELT DRIVEN

A. C. GENERATOR

ITEM #700 Ideal for powering electric tools, oil burner, refrigerator, lights, or other appliances requiring up to 700 watts of power. 700 watts, 115 Volts, 60 cycles A.C. 3600 R.P.M. Compact, self-regulating generator with V belt pulley and double outlet receptacle. Rotation counter-clockwise. May be driven by tractor or auxiliary gasoline engine. Requires 2 HP minimum. Dimensions: 10" long x 8" high x 6" wide. Shipping wt. 27 lbs.
F.O.B. Chicago..... 59.50

**RUGGED!! 25 TON MASSIVE!!
CAPACITY**

HYDRAULIC CYLINDER

- ALL STEEL CONSTRUCTION
- 8" BORE—15" STROKE
- DOUBLE ACTION



ITEM #1815
• 50,000 LBS. PISTON ROD WITH 1000 P.S.I. PUMP OUTPUT.
• UP TO 70,000 LBS.—CAPACITY ON INTERMITTENT SERVICE.
• SOLID STEEL 2 1/2" PISTON ROD
• 1" PORTS
• OVERALL DIAMETER—10 1/4"
• DISTANCE BETWEEN CENTERS—28 1/4" CLOSED—43 1/4" OPEN.

IDEAL FOR:

- HYDRAULIC PRESSES • DUMP TRUCK HOISTS • TD-18, TD-24 INTERNATIONAL HARVESTER DOZERS AND GRADERS • LEVELING RAMPS • INDUSTRIAL MACHINERY • ROAD MACHINERY • FARM MACHINERY • HYDRAULIC TAIL GATES

Replacement cost—\$300.00.
Shipping Wt.—185 lbs.
SPECIAL PRICE F.O.B. Chicago..... 95.00

**GROBAN
FOUR-WAY OPEN CENTER
HYDRAULIC
CONTROL VALVE**

ITEM #126—Four-way open center control valve, with built-in adjustable relief valve factory set at 1000 P.S.I. Spring loaded neutral position. For use with one double acting cylinder. In neutral position cylinder is locked and pump unloaded. Can be used as single unit or mounted in series. Has 3/4" pipe thread inlet and outlet. 1 1/2" pipe thread cylinder ports. Finger grip handle. Ship. wt. 10 1/2 lbs.

**AN OUTSTANDING BUY!
F.O.B. Chicago 21.50**

**Brand New! 5-TON BLACKHAWK
HYDRAULIC LIFT KIT**

Now Only 38.95 Complete

The Complete Kit

For — • Dumping farm wagons • Adjusting depth of plows • Hydraulic press • Hydraulic jack • Snow plows.
KIT CONSISTS OF:
1—Brand new Blackhawk Model P-151—Hydraulic hand pump with built-in oil tank and release valve. Rated from 1200 P.S.I.—to 8000 P.S.I. 20" handle. Dim. 8" x 8" x 6"
Item #82..... 22.50
1—6 Ft. length double wire braid rubber covered hydraulic hose—tested to 20,000 lbs.
Item #2784..... 3.95
1—Hydraulic cylinder, 2" bore, 6" stroke, husky 1" solid steel shaft, will lift 10,000 lbs., using pump pressure. Standard elev. mounting. May be used for double action service.
Item #4101C..... 12.50
2—4 ft. non-toxic hydraulic fluid. 1.00
All necessary hydraulic fittings.
Total ship. wt.—40 lbs.
COMPLETE KIT PRICE 38.95
ALL OF ABOVE INCLUDED F.O.B. Chicago



**BRAND NEW 1955!
FACTORY-TO-YOU-VALUE
PORTABLE ELECTRIC
LIGHT PLANT**

POWER TO OPERATE:
• 8" Electric Saw, Electric Drills, Pipe Bender.
• Refrigerator, Deep Freezer, Incubator.
• Water Pump, Radio, Lights, Air-conditioner.

**COMPACT—FITS
IN THE TRUNK OF YOUR CAR**
1000 watts output, continuous duty. 115 Volts A.C. 60 cycles, 9 amps. Powered by husky, easy starting Clinton engine. Engine and generator operate at 3600 R.P.M. for maximum efficiency at minimum weight. Both units are mounted on welded base, with heavy sheet metal belt guard. Generator is self regulating, and is equipped with outlet box containing fuse and 3 A.C. convenience receptacles. Cost only 5c an hour to operate. Dimensions: Length 20 1/2", Width 15 1/2", Height 16". Shipping wt. 100 lbs. F.O.B. Chicago..... **149.50**

GROBAN HYDRAULIC SPEED REDUCER

ITEM #115 7 1/2" x 1 1/2". Gov't acquisition cost \$428.00. Ship. wt. 31 lbs. Complete with 2 qts. of oil and full instructions. F.O.B. Chicago..... **54.50**

To place phone orders call WEBster 9-3793

**GROBAN SUPPLY CO. Dept. PM-5
1139 S. WABASH AVE., CHICAGO 5, ILL.**

**BERRY—HEAVY DUTY
HYDRAULIC PUMP OR MOTOR**

ITEM #166—Use on road machinery, vibrators, paper mills, wire reels, hydraulic presses, speed control units. Ball bearing construction, balanced cam design assures high efficiency performance. When used as a pump: delivers G.P.M. 1 0 0 0 P.S.I. 8 I.P. At 1200 R.P.M. as a HYDRAULIC MOTOR: Rated up to 12 H.P. up to 2400 R.P.M. Standard 3/4" pipe thread ports, 3/4" shaft with keyway. Dimensions: 14 1/2" x 8 1/2" x 7". Weight 63 lbs. Regularly \$212.00.
OUR SPECIAL PRICE 59.50 F.O.B. Chicago



**U.S. NAVY
ALL BRONZE
CENTRIFUGAL
PUMP**

Equipped with 6" adjustable V pulley, 2" dia. inlet and outlet, 180 GPM capacity. These all bronze Centrifugal Pumps are ideal for use as marine bilge pumps, circulating pumps, fire protection or irrigation, car-washing, dewatering, basement sump pumping, lawn sprinkling. Will pump water, oil, brine, gasoline, DDT, and sulphur compounds. Inlet and outlet take hose with 2 1/4" inside diameter. Dimensions: 11" x 8" x 11".

Total head-feet	Speed	H.P. GPM
25	3600 RPM	3 180
35	3000 RPM	1 1/2 90
20	2400 RPM	1 1/2 75

Back plate may be rotated for most convenient inlet position. Gov't acquisition cost \$96.00. Shipping weight 31 lbs. F.O.B. Chicago..... **29.50**

**DOUBLE ACTION
HYDRAULIC
CYLINDER**

ITEM #1024—3" bore, 24" stroke, 11 1/2" lift 7000 lbs. with 1000 PSI line pressure. 3/4" pipe thread ports. 1 1/4" solid steel shaft, ground and polished. Overall length, closed, 37". Steel cylinder barrel, tie rod construction. Clevis mounting at base. Removable clevis on shaft. Shipping wt. 45 lbs.
F.O.B. Chicago..... 39.60

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Only Compass APPROVED by Auto Makers



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AUTO COMPASS**
Your best friend in strange places. Shows you the right way—the short cuts. Compact—attractive. Fits all cars. Send for FREE folder "Pants Knives and Compasses".

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"ESHELMAN"
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2 Passenger
MOTOR CAR**
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Commended
by Parents'
Magazine
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TIME SAVING TIPS

ALL YOU NEED IS A TUBE OF

DU PONT DUCO CEMENT

REG. U.S. PAT. OFF.



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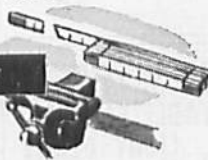


First aid for broken glasses! Keep transparent "Duco" Cement handy for emergencies!

Fill in chipped windshield with tough, waterproof "Duco" Cement—you see through it!



STRONG



Repair chairs — "Duco" Cement anchors loose rungs, makes chairs sturdy in a very few minutes.

Rejoin broken rule in a jiffy with "Duco" Cement—made to measure for strength!



WATERPROOF



Mend leaky watering cans without solder—easy-to-use "Duco" Cement makes a strong, watertight seal.

Fasten patches on small rips in canoe canvas with "Duco" Cement—it's rugged and waterproof!



FLEXIBLE



Don't just sew a torn mitt—cement it too, with strong, flexible "Duco" Cement.

Stop a runner with a dab of "Duco" Cement—flexible... so clear it's almost invisible.



A household favorite for 25 years



**BETTER THINGS FOR BETTER LIVING
... THROUGH CHEMISTRY**

"Power steering and brakes are two of the greatest contributions to ease of driving since the automatic transmission. — New Jersey storekeeper.

"Plenty of room inside." — Michigan plumber.

"I like the color combinations. It's one of the best-styled cars this year." — Maine lineman.

"Quick starting in cold weather." — Vermont automobile mechanic.

"Assembled better than the average car today." — Illinois realtor.

"Dealer service is excellent. They have taken care of all my complaints, even to painting the top, trunk and rear fender." — Vermont salesman.

And Here Are More Complaints

Close behind the complaints of poor gas mileage and Hydra-Matic troubles is the usual complaint of too many squeaks and rattles. This is followed by complaints about the heater and defroster, oil consumption and others. The quotations that follow are representative (they appear in order of the frequency of mention):

"Has too many squeaks and rattles. The dealer advises me that they come and go, but too many of them are staying." — Washington bakery driver.

We have already given quotations about the heater and defroster operation.

"Oil consumption is a complaint, but it is improving. We were getting 200 miles to a quart. Just made a trip of 569 miles and used only one quart." — Michigan trucker.

"Mechanics claim when engine is broken in, oil consumption will be less if there is any at all." — New Jersey salesman.

"Hood shakes and appears loose. Hood latch very poor." — Michigan Pontiac dealer.

"Had trouble with paint cracking and chipping." — Connecticut diner owner.

"Windows hard to close. Doors work hard. Trunk lid doesn't fit." — Massachusetts carpenter.

"I don't like the inability of the dealer to obtain proper service representation when a problem arises. Also his inability to get tools for the work." — Illinois attorney.

"Gas filter clogged in first week due to dirt in gas tank, resulting from carelessness at factory." — New Jersey executive.

"Whine in rear end. Was advised to run car for a while and it might work out. It did not." — Massachusetts insurance man.

"Oil-pressure gauge is too low. Gear-shift handle makes it hard to read." — Illinois steam fitter.

"Location of heater controls is a definite hazard in event of a collision. Driver may be thrown forward in his seat, striking his

(Continued to page 260)



NEW WHEELED TRAILER JACK SAVES YOUR ACHING BACK!

Solid steel threaded shaft. Fits any trailer. Handle folds, wheel removes for road travel. Only \$16.96 postpaid. We make trailer axle assemblies, couplers and jacks. Find out about 'em today!

HAMMER BLOW TOOL COMPANY
WAUSAU 13-E, WIS.

NU-WAY HEAVY DUTY CUTTING UNIT
with Timken Roller Bearings

PRICE
\$16.50

WHY PAY MORE



Build your own rotary type lawn or weed cutter. Take the hard work out of weed cutting. Build yourself an up-to-date weed and lawn mower with the Nu-Way heavy duty unit.

WRITE FOR FREE CIRCULAR & BUILDING INSTRUCTIONS
TRACTOR-LITE MFG. CO., Adair, Iowa

BUILD FINE GRANDFATHER CLOCK NOW

The simple sensible Red-i-Kut way as thousands have — SAVE HALF! SHOP TESTED PLANS — "SPIRIT OF THE CENTURY" Narrow waist 83" tall or stately straight side "SPIRIT OF AMERICA." EASY-TO-FOLLOW photomontage PLANS tell all—plus BROCHURE of heavy brass weight Westminster, tube chime, movements, gorgeous dials, 3/4" solid mahogany case kits. Send \$1.00 today — Both plans \$1.50 NOW.

KUMPEL CHIME CLOCK CO., 27 Kumpel Bldg., Minneapolis 16, Minn.



SPUTTERBUG
NEW FLASHY, NOISY FLOATING LURE

Big head spinner makes terrific surface noise — really wakes up the big ones. Many sound and action effects. 9 colors. 5/8 or 1/4 oz. \$1.35 ea.

WRITE FOR CATALOG

FRED ARBOGAST CO., INC., 2205 W. North, Akron, O.

WONDER DRILL SAW BIT

DRILLS and SAWS

DRILLS OWN STARTING HOLE

Combination bit for electric drills. Use as a drill, saw or reamer. Use for circles, ovals, squares, inside, hard-to-reach work. Works equally well in metal, pipe, wood, plastic, etc. Easy to use. Every carpenter, mechanic, electrician, plumber, hobbyist needs one. Made of abrasive resistant, hi-speed steel. Stands severe, continuous use without breaking. Resharpens free. Use with electric drill, slow drill press, lathe or milling machine. 1" diameter, 2" cutting section, total length 33". 3 types—wood, metal or all purpose. Set of 3, \$5.75. Details on request. Dealer inquiries invited. Money Back Guarantee. Shipped same day. Send check or money order to

WONDER DRILL COMPANY
Box 8321, Dept. PM 4 Kansas City 5, Mo.

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Shows Truscon Double-Hung Steel Windows Series 138 Are Easy For You To Install



THIS FREE BOOK could save you hundreds of dollars. Clear pictures and explanation are easy to follow. Step-by-step guide shows you how to install Truscon Double-Hung Steel Windows—just the way the professionals do it. You see and learn how simple installation is in frame, brick veneer, masonry and concrete-block construction. How to anchor, caulk, glaze and plaster. Hammer, screw driver and level are the only tools you need.

You buy Truscon series 138 windows from your dealer ready to install. All hardware is attached. Stainless steel weatherstripping and tape balances are built in. You choose from a wide range of sizes. Storms and screens available, too.

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Please rush free book showing how to install Truscon Double-Hung Steel Windows, Series 138.

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Address
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No Sanding! No Finishing!



Bruce PREFINISHED Oak Floors

BLOCK, STRIP OR RANCH PLANK—Now it's easy and economical to give your home the new beauty of modern oak floors...with all the glamour of nationally-famous Bruce Prefinished Hardwood! In only a few hours, your living room, bedroom, dining room—or that unfinished room upstairs—will glow with a style as modern as tomorrow. You can choose Block, Strip or Ranch Plank design.

It's EASY! These floors are completely finished—even waxed—at the factory. Just cover old floor or smooth subflooring with felt paper and nail down this highest quality oak (or install in mastic over concrete). No sanding or finishing...no mess or smell. Ready for use as soon as it's laid...and your home will have the rich style and beauty chosen by leading decorators.

It's ECONOMICAL! A new Bruce Hardwood Floor will cost you less than a good rug or carpet...and will last the life of your home. The famed Bruce "Scratch Test" proves this durable finish doesn't scratch, chip or mar. Ask your lumber dealer for an estimate. Mail coupon below for colorful literature.

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Bruce Hardwood Floors

Product world's largest hardwood flooring maker

knees on the heater levers. I was in an accident and sustained a severe and painful knee injury that way."—Illinois executive.

"Too little legroom in front seat for a tall man. On long trips it is uncomfortable."—Oregon logger.

"Sharp edges of metal on back of front seat cutting through upholstery where rear-seat passengers put feet."—Washington contractor.

"Underside of front fenders should not show."—Illinois insurance agent.

"Hand-brake handle catches clothes when driver gets in. No splash pan to prevent rainwater from hitting fan."—New Jersey account executive.

"Dealer should take care of bumpy tires instead of owner having to go to tire dealer."—Ohio bailiff.

"Driver's side of front seat does not fold down far enough for easy access to back seat and will not stay down unless held."—Ohio fireman.

"Position of accelerator pedal causes cramps in my ankle. It is at an odd angle as well as being too close."—Illinois engraver.

That is a representative summary of the statements made by owners of the 1955 Pontiac. For a precise breakdown of percentages of owners making such statements see the table on page 121.

Floyd Clymer's road-test report of the Pontiac V8 begins on page 118. ★ ★ ★



Roofing-Nail Holder Worn on Worker's Head

Headgear that dispenses shingle nails speeds the work of roofer Clay Tribble of East Detroit, Mich. Made of light-gauge sheet metal, it holds a handful of nails at a time. The nails hang in a slot. With a flick of his head, the wearer can drop the nails into place, heads up, for quick easy reach. Tribble has been wearing the device at work for 20 years.

MOTORISTS LOOK AT these AUTOMOTIVE BUYS

DUAL POINT PLATES

HIGHER TOP SPEED

A Double-Thrust Self-aligning Bearing Distributor Plate. Assembly. Quicker starting. More power. Better performance. Greater coil saturation. Smoother acceleration (at all speeds). Greater gas mileage. Longer spark plug life. Less wear. Spark assures complete combustion. Specially made and polished.

Stock No. 14—Plymouth, DeSoto, Dodge Chrysler POSTPAID \$4.95
 Stock No. 45—49-53 Ford V8 & Merc—\$3.54
 Chev. 3-4-49, Buick, Olds & Pont—\$3.95
 each POSTPAID

New Modern "Caddy" Style Headlight Rims

CHROME PLATED

- EASY TO INSTALL
- NO HOLES TO DRILL

Gives cars that "Look of Tomorrow" — for that modern appearance.

Stock No. 29—fits 1952-53 Ford, 1953-54 Chevrolet, 1949-53 Cadillac, 1949-52 Pontiac. POSTPAID \$6.95
 Stock No. 95—fits 1949-52 Buick, 49-52 Cadillac, 48-49 Chevrolet, 49-50 Chrysler, 49-54 DeSoto, 49-54 Dodge, 49-51 Ford, 47-52 Kaiser-P. POSTPAID \$5.40
 Stock No. 96—For 1955 Ford. POSTPAID \$8.85

DYNA Highly Polished Aluminum CARBURETOR SUPERCHARGER

Easily installed. Complete with gasket, screws & instructions. A highly efficient mixing chamber that actually mixes gas and air. Lowers the fuel-air temperature 50 to 60 degrees, allowing the mixture to enter the carburetor before condensation takes place.

- INCREASES MILEAGE
- INCREASES POWER
- GREATER ECONOMY
- GREATER HORSE POWER
- Eliminates "PING"

Many owners report complete absence of "Ping" due to uniform fuel dispersion, even with low test fuel. For All Cars.

Give Exact Year, Model and Make of Car.

Stock No. 101—Each POSTPAID \$23.60

EXHAUST CUT-OUT

UNIVERSAL—Fits All Cars

Exhaust time is controlled from the dash. Can be used as a cut out in the country and closed in restricted areas. Or may be used to operate two different toned mufflers. Well constructed of heavy plate steel. Strengthens the exhaust pipe.

Stock No. 66—POSTPAID Each \$3.42

KNOCK OFF TYPE SPINNER

Die Cast Bright Chrome Plated

Can be bolted on most any hub cap or full wheel disc. Gives car that Continental look. Round front 3 1/4" diameter, overall diameter including knocker-off 7 1/4". Thickness 3/4".

Stock No. 70—POSTPAID—SET of 4 \$5.21

Theft Proof HOOD LOCK KIT

Operates from the dash. Protects all Underhood Parts from Theft.

Fits Ford, Chevrolet, Plymouth and All Cars With Out Side Hood Latch.

- Complete Do-It-Yourself Unit
- Easy Step by Step Installation Instructions
- Does Not Interfere with Original Hood Safety Catch when Properly Installed
- Prevents Hood from Being Opened When Car is Locked
- Protect Your Power Steering Unit, Battery Heater, Etc. Fully Guaranteed.

Stock No. 56—POSTPAID Each \$3.95

HOT ROD FENDERS

For use in Custom Re-Designed Autos, Trailers, Cycles and other Mobile Equipment. Sturdy—Lightweight—Durable. Made of 20 gauge steel. Contoured to fit all automobile tires. Universal mounting brackets adapt to standard brake back-plates. Prime finished—ready to paint.

No. 31 For \$8.95

HIGH COMPRESSION HEAD GASKETS

EXTRA-THIN .020" SOLID COPPER

These copper gaskets are only .020" thick. It is the same as milling heads .040" to .050", and "hops up" the motor to give amazing acceleration, power and mileage. State exact year, make and model when ordering. (If car is V8 type two gaskets are furnished at no extra charge.)

Stock No. 21—POSTPAID \$4.95

HI-SPEED ELECTRIC SIREN

Developed especially for the U. S. Navy & Coast Guard. Now used by hundreds of Fire & Police departments, buses, ambulances, etc. Complete with bracket, screws, 10 ft. of cable & push button. Green Enamel.

No. 71—POSTPAID—12 VOLT \$13.24
 No. 91—POSTPAID—40 VOLT \$13.70

Specify Voltage when ordering.

AH-000-GAH Chromed HORN

State Voltage Needed.

Here it is for the sport car enthusiast. Not a vibrator or other substitute but a genuine motor driven horn.

Stock No. 60—Postpaid—4 VOLTS, 12 VOLTS \$12.60

CUSTOM BUILT DUAL MUFFLER SETS

2 HOLLYWOOD TYPE MUFFLERS

For ALL V8 ENGINE! All sets include:—

- 1 DUAL Side Head Pipe. 1 Set of Clamps.
- 1 Dual Side Tail Pipe. Easy installation.

Dual flow installation eliminates 75% or more of the back pressure in existing standard equipment cars. Tests prove that these sets INCREASE HORSEPOWER as much as 7%. You get smoother—increased performance and better idling. All sets Custom Built for perfect fit. Easy to install.

Stock No. 87—For following Cars: per set
 53-55 BUICK \$32.50
 55-57 CADILLAC, except Convert. \$27.50
 1955 CHEVROLET, except Convert. \$24.50
 51-53 CHRYSLER, except Convert. \$37.50
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 53-53 Ford V8, 1953 54-55 Ford V8 \$22.95
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 1955 Pont V8 24-93 1955 Plymouth \$24.95
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Be sure to give make, year, model, body style of car & state if you have Power Brakes, Power Steering, Standard or Automatic Transmission.

HOW TO ORDER:

Send payment in full or 25% deposit with order. Balance shipping charges on items marked Postpaid. Others F.O.B. Chicago. Be sure to give make, year and model of car. 100% SATISFACTION GUARANTEED or Money Refunded.

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FREE GOOD USED TUBE WITH EVERY GOOD USED Famous BRAND TIRE

Every Tire & Tube Guaranteed, 50% to 90% HIGH TREAD!

Each tire thoroughly inspected & repaired. "Hot" "Retreads or re-caps" but Famous Name Brands. Free Tube with each tire purchased. Give size when ordering.

No. 122	6.00-16
6.50-16	
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7.75-15	
7.60-15	
8.20-15	
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FOR BOTH TIRE AND TUBE \$4.95

Electric TRUNK KIT

This Electric Trunk Release Kit enables the Custom Car Owner to open his trunk from inside the car by the touch of a button. Easily installed. Kits come complete with illustrated instructions. All C.M.C. 49-52.

For 36-53 Ford & Mercury, except 490 Oldsmobile 98. No. 76—State year, make & model. Each Postpaid \$6.56

CHECKERED FLAG EMBLEM

Die Cast... Triple Chrome Plated! No Holes to Drill... Just remove backing and apply. Auto Hoods, Fenders, Trunks, Doors, Etc. 4" Wide, 1 1/4" High. Chrome. Chrome.

No. 57—Postpaid—Each 98c

DEEP TONE Fiber Glass Packed MUFFLERS

Increases horsepower, increases gas mileage, straight-thru construction, no back pressure, no high pitch irritating noises, deep powerful non-offensive tones. Specify make and model.

Stock No. 37—Postpaid \$4.95

PLASTIC "SEAT-SAVERS"

One size fits all makes of cars

- Made of finest heavy gauge plastic with reinforced stitched seams.
- Completely protects present covers—front, back and seat.
- Ideal for shop men to protect upholstery.
- Slips on and off in a jiffy—no elastic or tapes to fangle, fray or pull out.
- Completely washable, waterproof and greaseproof.

No. 82—Each seat \$2.95

BERMUDA CLANGING BELL

It's the New "Bap!" Gives a most amusing and commanding two-tone bell sound. Easily installed under car floor by driver's seat. Step on plunger. Highly polished. Fits any car.

Stock No. 49—Postpaid \$3.95

REAR-VIEW MIRRORS

Special Curved Glass Gives Curved Vision—Eliminates Blind Spots—Wider Range of Vision thru the Larger Windows of New CARVED MIRROR—2 1/2" x 10"

In Metal Case Painted a Neutral Grey Hammered Finish with a Plastic Trim to Match.

No. 99—Fits all cars. Give exact year, make & model. Each \$2.94

Flared FENDER SKIRTS

All metal. Prime finish with rubber beading. For these model cars:

49-54 Chevrolet	46-54 Frazer
except Bel Air	46-54 Kaiser
46-54 DeSoto	49-53 Olds, 76, 88
46-52 Dodge	46-52 Plymouth
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Clymer Road Tests the Pontiac

(Continued from page 118)

heater unit is under the front seat and even at slow speeds ample heat was available at all times. The levers which regulate the ventilating and heating system are the easiest to operate and the best that I have ever used. For additional fresh air, two separate knobs can be pulled out to flood the car with unheated air. The cool-air intake should be shrouded to prevent snow from blocking it.

When I hit the dry highways, the car was thoroughly broken in and I really "high tailed" it across the wide-open spaces of the Midwest. The engine is extremely free from vibration, but there is considerable hood flutter at high speeds and on rough roads. The car has good acceleration, but I was not impressed with its top speed; it is only average. Top speed is 105 miles per hour by speedometer, which is about five percent fast. Riding qualities are excellent and the roadability is far better than average.

The 25:1 steering ratio is good and, even without power steering, the car steers easily. The vertical king pins possibly add to the ease of handling and the good front-end stability. Even on fast curves the body remains level.

No water leaked into the body, nor did squeaks or rattles develop. The body has a solid feel and the doors open and close easily. The driving position is excellent. Cushions front and rear have excellent springs. Three levers operate the controls of the extra-cost adjustable seat. The front seat can be raised, lowered, moved to the front or rear. It is not a power seat but it does tilt to 360 positions.

The thing I found most annoying about the car was the hood vibration at high speeds. Also I don't like the new ball-pivot rocker arm. I'd prefer the usual rocker arm on a shaft. Also I was disappointed in the performance at top speed, which I think might be helped by redesigning the union where the exhaust pipe crosses over from the left bank and joins the right-bank pipe to form the gas outlet to a single muffler. Instead of a graceful curve so that the outgoing exhaust from the left bank would flow freely into the outgoing exhaust from the right bank, there is a most abrupt T-head union at the point where the two pipes join. Had this design been used on my early Maxwell, Reo or E-M-F, I wouldn't have thought much about it but, in my opinion, it is a design that might be expected from a country blacksmith instead of from Pontiac engineers. By redesigning

(Continued to page 264)



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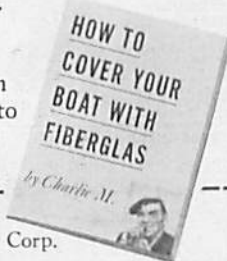
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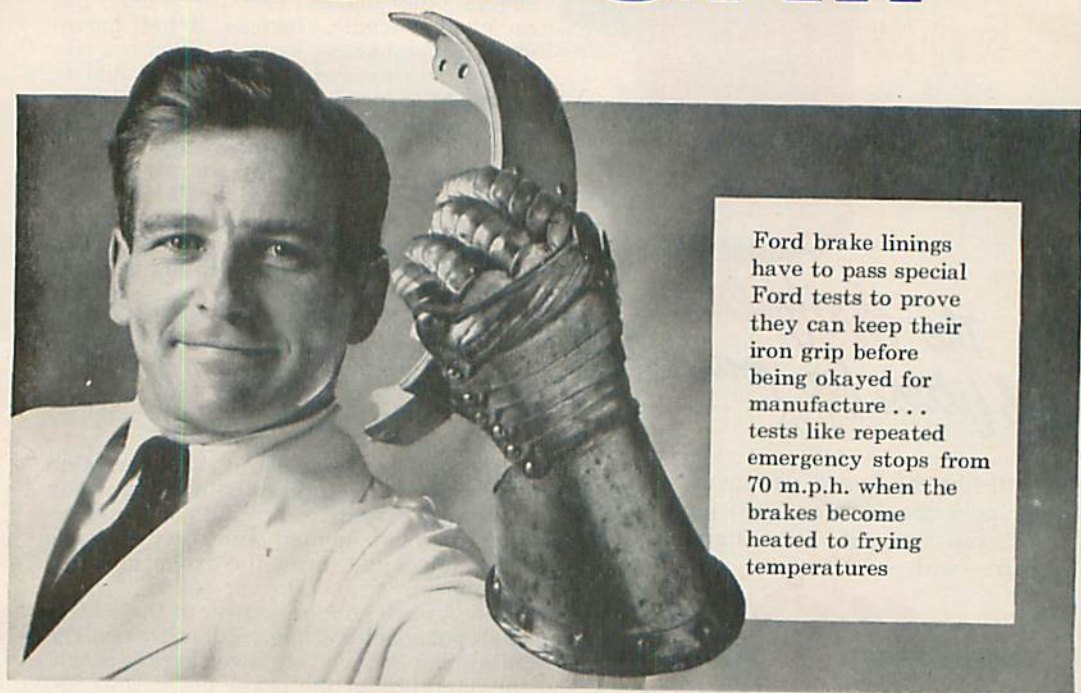
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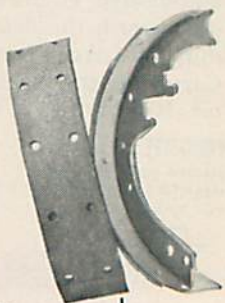
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When new brake linings are called for in your Ford it's very much to your advantage to specify Genuine Ford brake linings. Here's why . . .

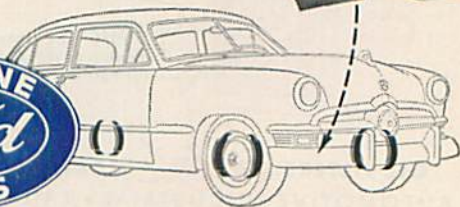
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the exhaust-pipe union to make it a free-flowing system, Pontiac can step up top performance 3 to 5 miles per hour, which the engine is easily capable of handling.

The instrument panel is one of the best I ever sat behind. Even the full horn ring does not obstruct speedometer vision as on several other makes. The speedometer has no visible needle. Instead, a half-moon-shaped metal piece, looking like a red ribbon, moves around the calibrated dial to indicate the speed. I like this unusual idea. Odometer figures are very easy to read through a magnifying-glass cover in the speedometer housing. The starter is operated by the key. The Hydra-Matic indicator dial is located high on the steering column, close to the wheel, and is easy to read. In my opinion, this location is better than that used on some other makes of 1955 cars where the indicator is on the instrument cowl, some distance from the driver's eyes. In the snow, I had to "rock" the car many times and having the Low and Reverse positions next to each other helped a lot.

The brakes are excellent. The operation of Pontiac power brakes is the best of any car I have ever driven. Unlike most power brakes, when applied quickly they have less tendency to throw the driver and passenger forward. The so-called "power brakes" have no more power at the wheels or stopping ability than regular brakes. The only thing in favor of power brakes is that the operation of the brake pedal is easier, due to the power assist. One of the disadvantages is that the driver has no "feel" as to the brake action. All of the action usually takes place with 1/2-inch movement of the pedal. The left-hand-operated emergency brake is easy to apply and release. Until the brake is released, a flasher light operates when the ignition is on. The high quality of the interior finish and all appointments is quickly noticeable.

As I drove over the long, straight highways, I had a good chance to test the performance and suspension at high speeds. The brakes required no adjustment upon arrival in Los Angeles, even after the long test through water, snow and slush. There was very little brake fading.

The Hydra-Matic transmission gave satisfactory performance. Below 60 miles per hour, the passing gear operates smoothly when the throttle is depressed.

Vision is excellent through Pontiac's panoramic windshield. Rear vision is above average. The high rear-fender tips serve as a guide for parking or in backing.

Gas economy is about average. I added one quart of oil at the end of 1000 miles and another at about 2500 miles. ★ ★ ★



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New Student Set Features TV-Type Tube and "Peg-Board" Chassis

(Continued from page 160)

down through the pins before soldering.

The set should have a good water-pipe or similar ground—and for distant reception an outside antenna is necessary. It will bring in strong locals with a 10-foot indoor antenna wire. A good ground improves reception.

Before testing the set, first recheck the wiring to be certain you have made no errors. Now connect the antenna and ground—plug the set into the line—and turn it on. Watch the underside of the chassis as the set warms up. At any sign of sparking or smoking, shut it off at once and determine the cause. If everything seems okay, turn the set over and see if the tube is lighting. Now listen in the headphones; first advance the volume (regeneration) control R4 fully clockwise. Rotate the variable-tuning capacitor and, if all is in order, you will hear sharp whistles as the set tunes to various stations in the area. If not, reverse leads 1 and 4 on L1 in the plug-in coil form, Fig. 1A. The whistles can be halted, and the stations made clear and strong by slowly backing off the regeneration control R4. The trimmer capacitor C1 determines the amount of coupling between the set and the antenna. Adjust the setscrew with a small screwdriver; turning the screw all the way in provides the maximum signal strength. However, the set is more selective with the coupling reduced (screw backed off). The proper setting is one which you will have to determine for your own area and the particular antenna you are using. Once set for your antenna it need not be touched. Should excessive hum occur, reverse 117-v. a.c. sec. leads on transformer T1. Detailed student material list R-433 for this one-tube "Peg-Board" beginner's set is available from *Popular Mechanics* Radio-TV and Electronics Department, 200 E. Ontario Street, Chicago 11, Ill., upon receipt of ordinary letter postage. ★ ★ ★

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Have We Sent a Rocket Into Space?

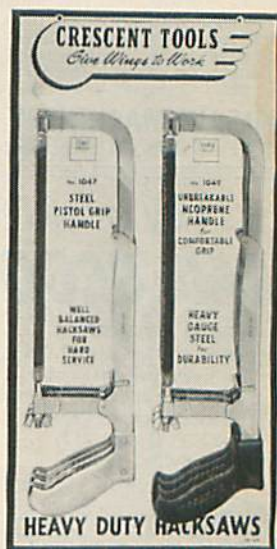
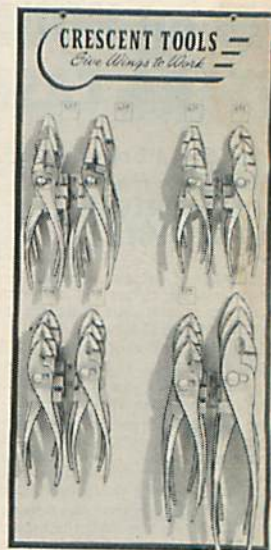
(Continued from page 112)

satellites could be launched for less than the cost of one of our big jet bombers by using the step principle. He has proposed a MOUSE (Minimum Orbital Unmanned Satellite for the Earth) rocket that would carry scientific instruments, and would circle the earth from pole to pole at a speed of 17,000 miles an hour, 190 miles high. Even if this altitude could not be maintained due to suspected atmospheric resistance, the satellite probably would make several thousand revolutions and signal much valuable scientific data before spiraling down to an altitude where it might be disintegrated by atmospheric friction.

Another proposal that has been reported calls for a rocket carrying 200 pounds of instruments and telemetering equipment, which would circle the earth at an elevation of 350 miles, presuming that atmospheric drag is inconsequential at that height. This satellite would start as a three-stage rocket more than 100 feet tall, weighing 90 tons. It would be fired straight up, then tilted slightly toward the east. At 30 miles up the second step would depart from the first, and would tilt farther east. At 250 miles the motor of the third (nose) rocket would lift it away from the second step and at 350 miles above the earth it would have attained the speed and direction necessary for maintaining a permanent orbit. This proposal is based on rocket motors that use alcohol as fuel and liquid oxygen as the oxidizer. Actually, more efficient propellant fuels have been "tamed" recently which may permit multistage rockets of smaller dimensions.

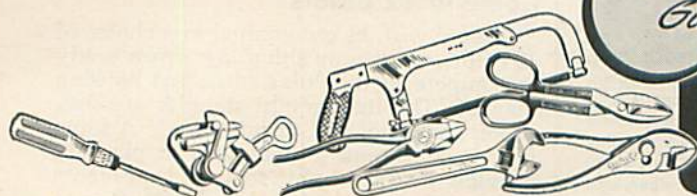
Certainly, the time is near for a practical satellite of small size. Just recently the Space Flight Committee of the American Rocket Society requested the National Science Foundation to undertake a study of the utility of an unmanned satellite. However, big "space platforms" with human crews are still many years away. Cost alone seems to write them off for the immediate future. Prof. Harry H. Goode of the University of Michigan estimates that a manned space vehicle would cost 40-billion dollars and take 10 years to build, including research time. This estimate is figured on a satellite large enough to include living quarters; a structure that would have to be sent aloft piecemeal into space aboard a "mother" rocket freighter as large as the Empire State Building, and this would have to make 20 to 100 trips up to carry the material for assembling the platform. It would have to carry 100 freight

(Continued to page 270)



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cars of fuel and weigh some 7000 tons. The finished man-carrying satellite would be put on its orbit 1000 miles up.

Before any volunteers will want to take their stations at that elevation, Professor Goode points out that there are problems to solve involving temperature difficulties, lack of breathing air, lack of normal gravity, possible collisions with meteoritic materials, and many other unknowns.

The fact is that there are many problems facing science before even small military satellites can become practical. For instance, will the temperature cycle (hot when exposed to the sun, supercold in the earth's shadow) eventually break up a fabricated metal structure? What will happen to propellant fuels 1000 miles up? If liquid, they may boil away under solar heat; if solid, they might not ignite when on the shadowed side of the earth. One of the biggest questions is how to bring such a missile back down through the atmosphere slowly enough to prevent its burning up like a meteor.

These are the problems the rocket scientists are trying to fathom today. If they have already dispatched a tiny rocket into space, they have made a small beginning. But only a beginning. ★ ★ ★

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save time and work!

Next time you're melting glue, line the pan with a piece of aluminum foil, such as your wife uses around the kitchen. After you've finished, simply lift out the foil liner. Saves messing up the pan, and any left-over glue can be re-heated for the next job.

Electrical outlets can be safely sealed against small children's fingers with a couple strips of masking tape. But be sure you use FLEXBAC® Masking Tape by CARBORUNDUM. It always sticks tight to any surface, peels off without leaving a trace. Pick up a couple "Handy Rolls" at your hardware or building supply dealer's. Comes 30 feet to a roll... costs so little, yet does so many jobs around the house or workshop.

Badly scuffed shoes, especially when the top layer of leather is torn away, can be repaired by "feather-edging" the scuffed spots with a piece of Extra Fine Flint Paper by CARBORUNDUM. Then you can use liquid leather restorer or polish to re-color the worn spots.

Impatient to get at your garden again? One thing you can do right now is put your gardening tools in first-class shape. Remove any rust you find by rubbing with CARBORUNDUM's Fine Emery Cloth. A little oil on the cloth will help you clean and polish at the same time. And here's the best way to put keen edges on your spades, hoes and other garden implements — use a No. 57 File by CARBORUNDUM. Lots of people don't realize CARBORUNDUM makes abrasive files. Ask your hardware or building supply dealer for a No. 57 File. It's specially made for farmers, gardeners and handymen... 14" long, tapered, with a comfortable handle. Made from tough, sharp "GREEN-GRIT" abrasive, it out-lasts and out-cuts metal files! Try one and see.

Everybody can use helpful short-cuts to save time and work around the house or in the workshop. How about sending me any good ideas you have discovered? Send 'em in on a postcard — a separate card for each idea. I'll pay you \$5.00 right away for every one I can use in later columns. Even if I can't use 'em (on account of duplicates, and such), I'll send you a worthwhile little gift for your trouble.

Want a Free Copy of a fine new booklet called "HOW TO SAND" which The Carborundum Company has just printed? It's filled with information on choosing the right sandpaper for every job, and other practical sanding tips. Just address a postcard to...



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Niagara Falls, New York

90-527

Will Streamlining Win the 500?

(Continued from page 95)

top contenders and potential winners. This year, Troy Ruttman, one of the most skillful, hard-driving "choffs" in the business, promises to make a greater challenge with the supercharged, 180-cubic-inch, front-drive projectile. Ruttman, winner of the 500 in 1952, took the Novi out for a test run immediately after last year's race and lapped the oval just under 141 miles per hour. Even though he had never driven the tricky machine before, he came within an ace of equaling McGrath's all-time lap record of 141.033 miles per hour!

The Novi is a peculiar machine to handle, because its power is transmitted to the front instead of the rear wheels, because weight distribution is therefore unorthodox, and because it has really shattering horsepower—now pegged at 650. The major changes made to this year's Novi entry are cast-aluminum wheels of original design and special spot brakes featuring four instead of two lining pads per wheel.

In addition to his radical new streamliner, Frank Kurtis has built five new versions of his famous roadsters—the type Bill Vukovich has driven to victory at Indianapolis for two years running. This year's Kurtis-Kraft, the model 500-D, differs very slightly from last year's type. The changes consist of small modifications to body panels and suspension, an air-vent slot in the tail section and forced ventilation through the driver's seat, which is upholstered in loose-weave nylon to permit the free flow of cooling air. In spite of their \$18,000 price, Kurtis cars are immensely popular and, because of their suitability for track competition, the top 10 winners usually include a majority of these California-built roadsters.

Cast light-alloy disk wheels probably will be used universally at the Speedway this year. Wire wheels, while heavier and not as strong, have offered better brake cooling in the past because they permit air to flow freely through their spokes. This year's magnesium wheels will have large air holes to do the same job.

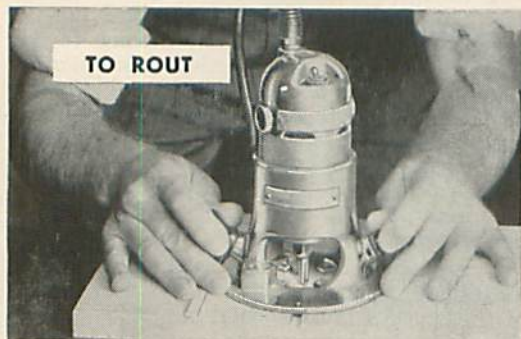
Most of 1955's new cars and several of the revamped veterans will be fitted with greatly improved spot brakes similar to those of the Novi. Instead of having just two lining pads per wheel, the new type will have four pads. The better brakes should permit drivers to keep the throttle open deeper into the turns and should contribute to faster lap speeds.

How fast the cars will go on May 30 depends on many things, but above all on the

(Continued to page 274)



The Right STANLEY Tool

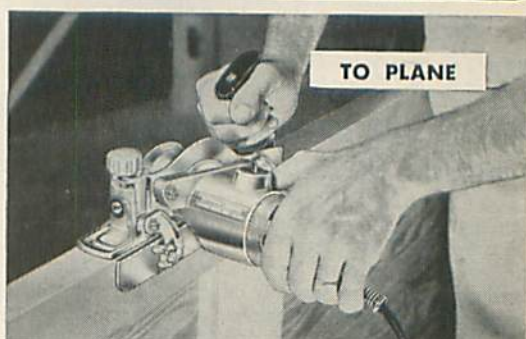


TO ROUT

The rugged little work horse of the workshop in 90% of your woodworking jobs. Versatile, light weight and high speed, its motor is used to power the plane shown. *H15 Router* — \$39.95.

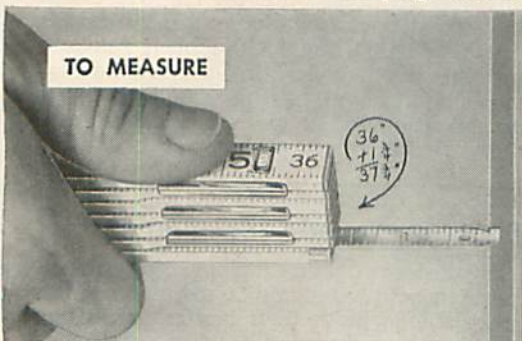
New! Router-Plane Kit

Combines H15 and H106 with gauge and bit in handy fitted carrying case. *H100* — \$89.95.



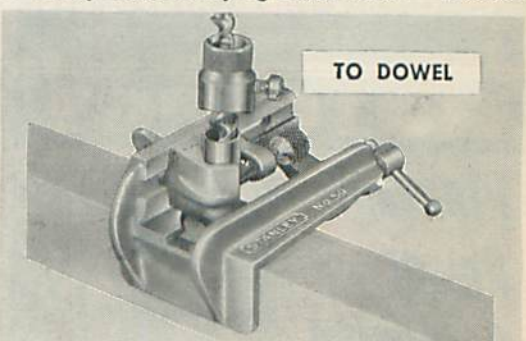
TO PLANE

This tool is a wonder for smooth and easy planing. Just right for fitting storm and screen doors and windows, trimming wood, plastic or aluminum veneers on table and counter tops. When you have H15 Router, Kit is all you need to convert to power plane. *H106 Plane Adapter Kit* — \$29.50.



TO MEASURE

Accurate measurement is fundamental in jobs of all kinds. Here is a new Stanley Zig-Zag Extension Rule with accuracy-plus features. Extra thick first leg has brass slide for inside measurements. Rule opens to even numbers, convenient marking gauge at 2", 4", 6", 8", etc. Plastic finish on sticks and nickel silver joints ensure longer useful service. 6 ft. No. X246 Extension Rule — \$2.10.



TO DOWEL

Joining two pieces of wood together is one of the first jobs a woodworker masters... and it isn't really mastered until you do it with dowels. Here's a jig from the Toolbox of the World that makes good doweling easy. With it you can bore holes accurately in edge, end or surface of wood. 6 guides for $\frac{3}{16}$ to $\frac{1}{2}$ inch bits and depth gauge furnished. No. 59 Doweling Jig — \$5.95.



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human element. When there's a bad crack-up in the time trials the other drivers become understandably depressed, conservative and cautious, and lap-speed figures shrink. But if everything goes smoothly and safely, the coming race should be the fastest of all time.

As for foreign entries, anything can happen. Speedway headquarters has had hungry nibbles from Italy and, during the Mexican road race, a Mercedes spokesman made loud noises about his firm's invasion of "The Brickyard." But after the Ferrari fiasco in 1952, Europeans, who are as awed by our Indianapolis race as we are by France's 24-hour grind at Le Mans, will not cross the Atlantic until they are 99 percent sure they can win.

One of the things that frightens them most about the 500 is the fact that it is one of the world's most specialized races and therefore demands racing chassis of extremely specialized design. And the Europeans have not a shred of experience in building Indianapolis-type chassis. This is where the Kurtis-Ferrari comes in. Last March one of the new 500-D roadsters was flown to the Ferrari factory in Italy to be fitted with one of Europe's finest racing engines. At press time, the car was about to be flown back to Indianapolis. No details on the Ferrari engine had been released but this much is certain—the Kurtis-Ferrari should be one of the most interesting and exciting Indianapolis entries in quite a few years. ★ ★ ★

Electronic Sound Lands Planes

In the days when airplanes were literal bird cages of wires and struts, many pilots were able to judge their landing speeds by the singing of the wind in the wires. Cleaning up of aircraft as speed increased cut the noise, and made fliers more dependent on their visual speed indicators, with the hazardous result that just one more instrument needed watching. The British have recognized this fact and brought sound, artificially induced, back into the landing process for carrier planes. Termed the Audio, the system involves installation of sound producers in the aircraft. Too high a note in the pilot's ears indicates too much approach speed and too low a note not enough. In Admiralty tests pilots were found to be paying less attention to their instrument boards and more to aircraft operation when Audio was employed.

◀ Moose broken to harness are being tested as farm animals in the Siberian Arctic, according to a United Nations report.

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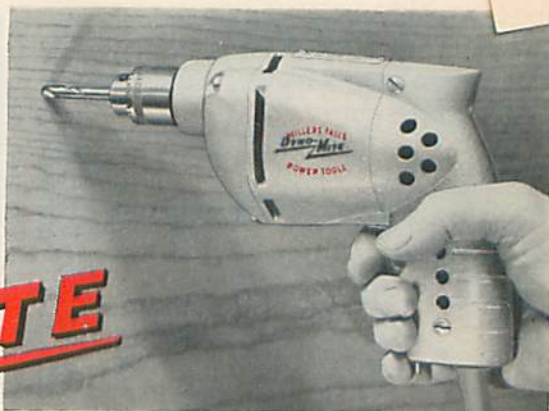
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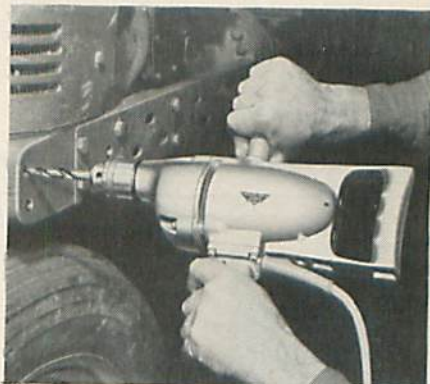
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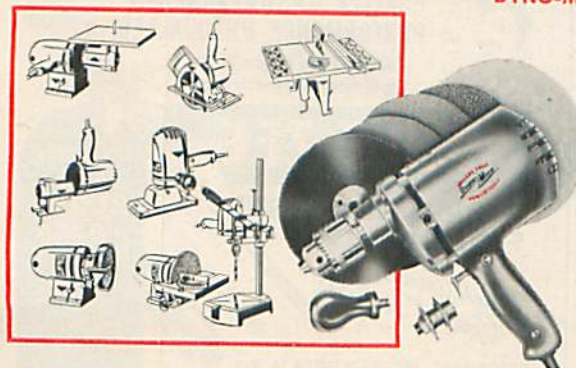
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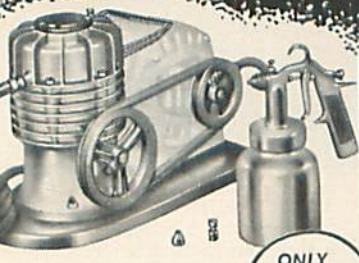
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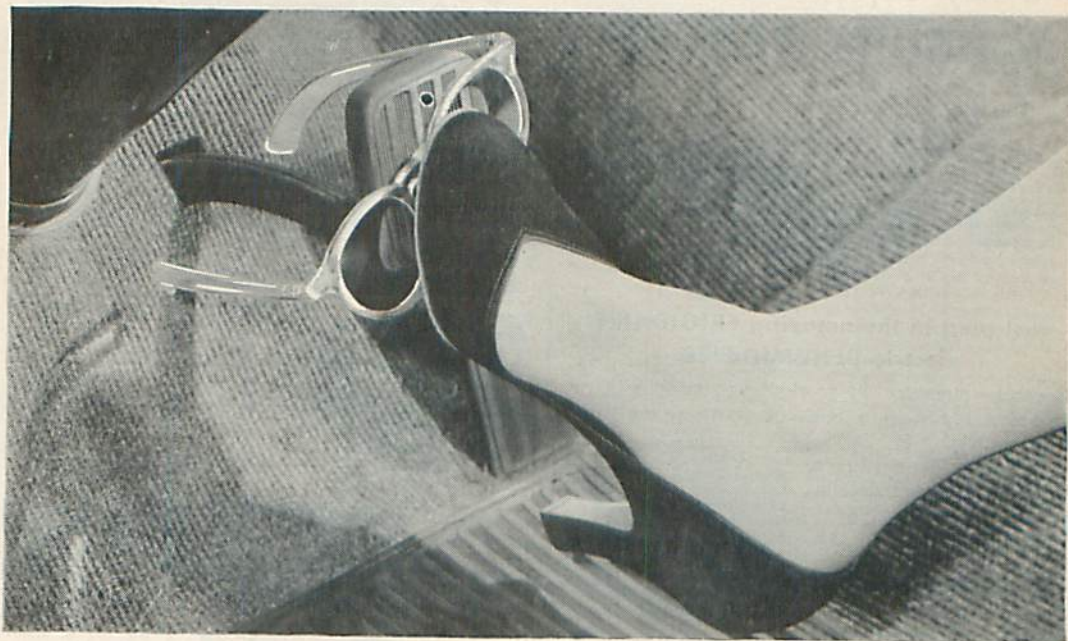
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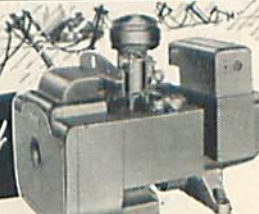
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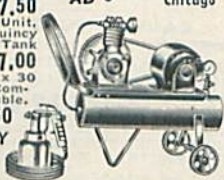
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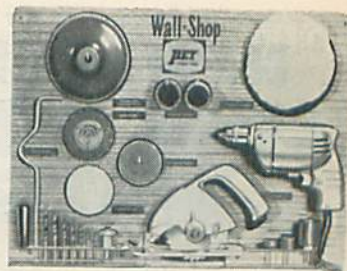
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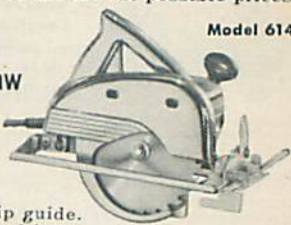
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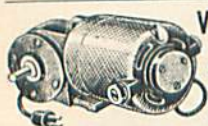
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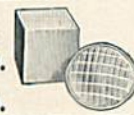
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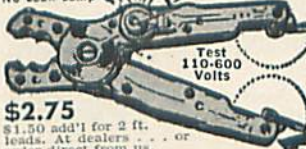
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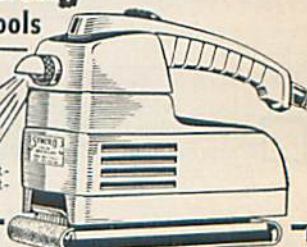
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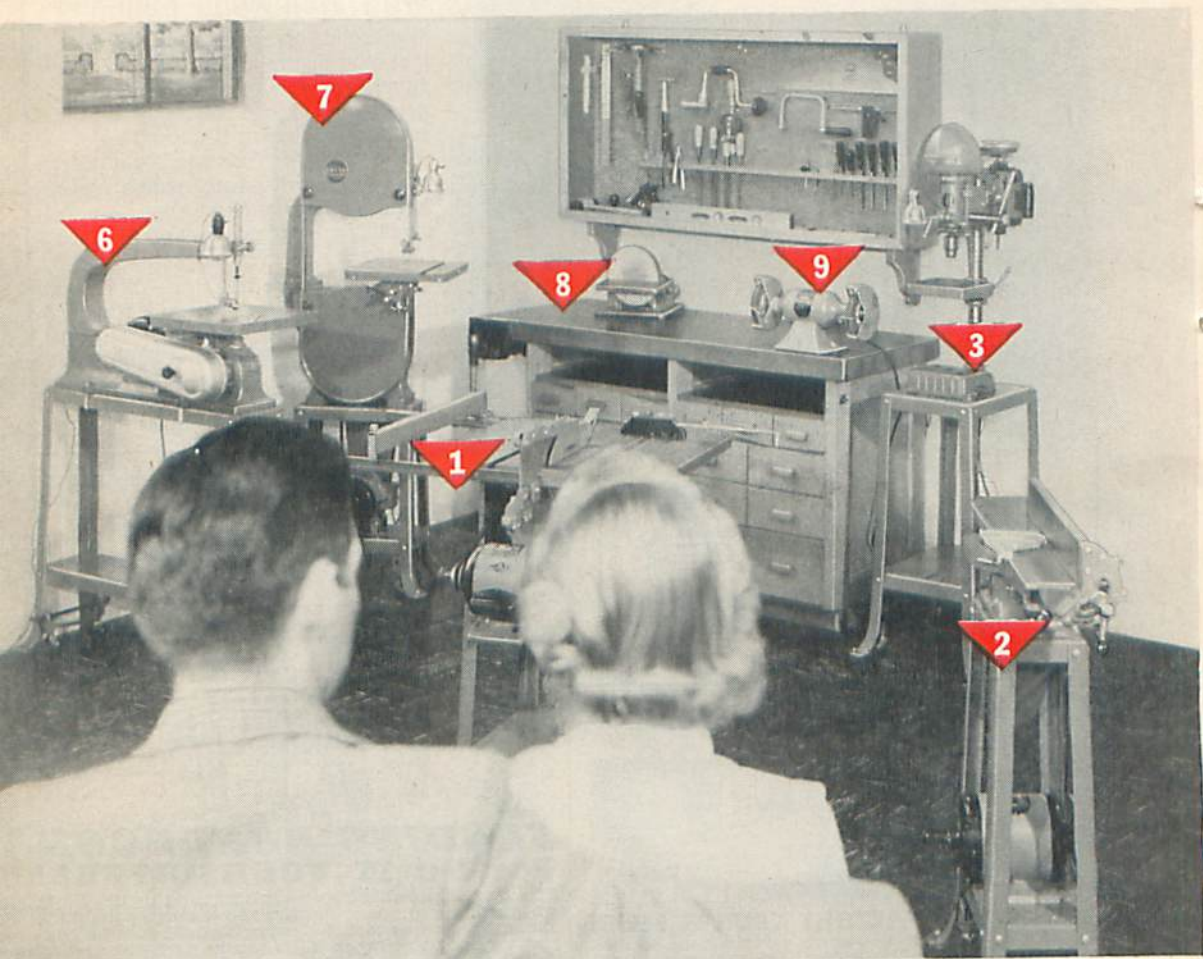
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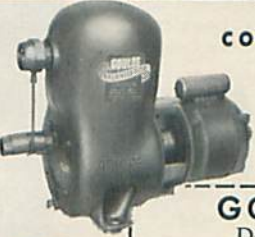


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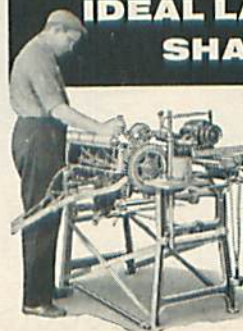
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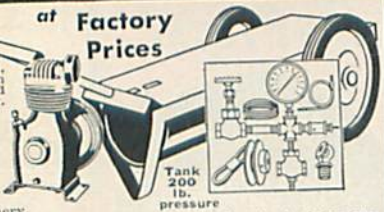
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No. 101—Reg. price \$110. Wt. 70 lbs. FACTORY PRICE... \$57.50

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BOTH UNITS CARRY 1 YR. Factory Guarantee

No. 102: Same as 101 with carrying handle for stationary or portable use. Complete outfit as described and illustrated, wt. 34 lbs., reg. value, FACTORY PRICE \$39.50



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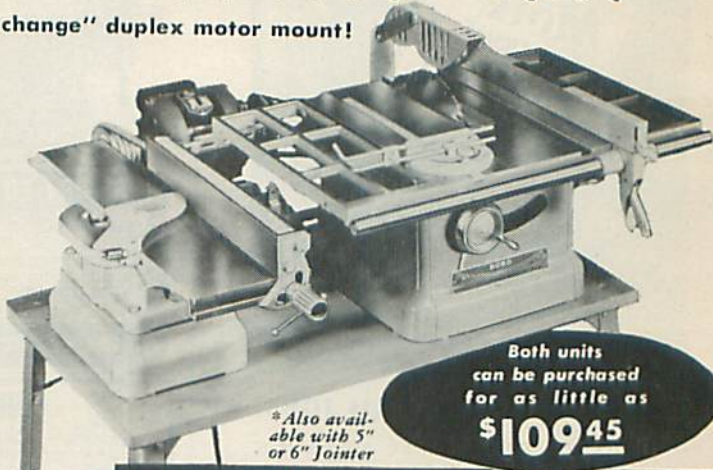
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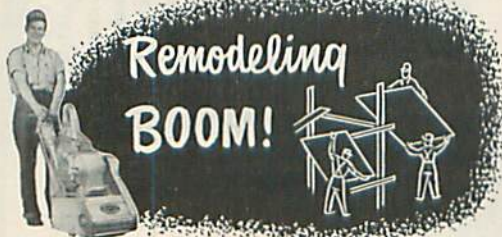
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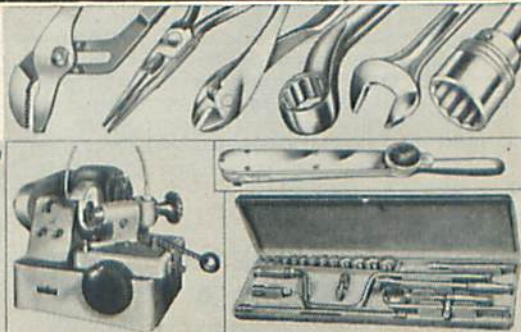
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Since mid-1954 LIFE-TIME engineers have been installing this unusual material in all batteries. It is a vast and important improvement over the previous best separator, a plastic-coated fiber sheet. You may be

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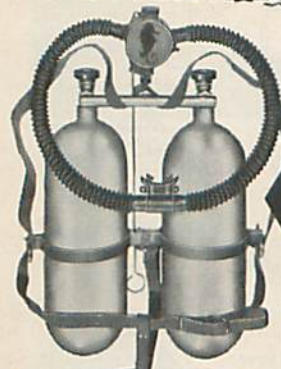
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Here's the Wood Putty that won't shrink; can be stained with regular wood stains, and so can be used on any kind or color of wood; fills nail holes, cracks in floor, furniture, plywood; sets door pulls. And, when mixed with varnish instead of water, it becomes a waterproof material for boat repairs or exterior use. All you need for 101 odd jobs around home, farm and workshop—Schalk's Wood Putty!

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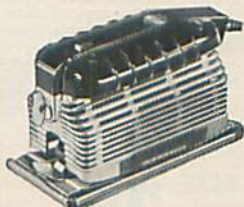
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RIDING OR WALKING TYPES also Rotary Mowers

2½ — 3½ — 5 and 8 H. P.

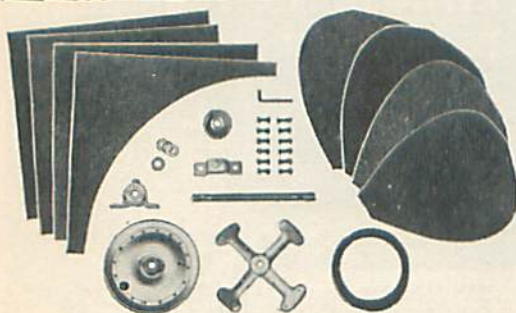
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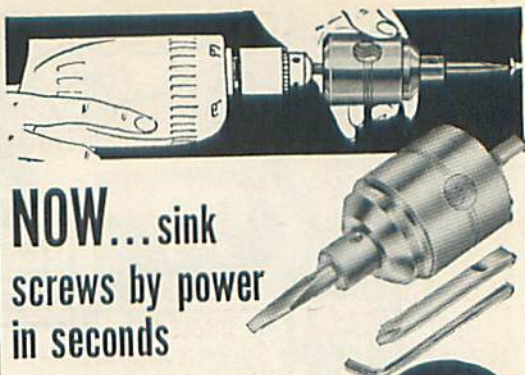
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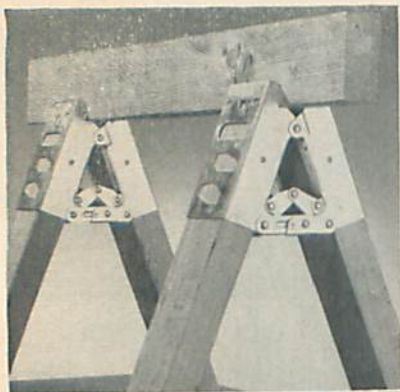
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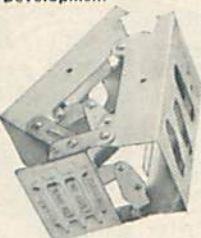
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HEAVY DUTY FAN. Semi-enclosed motor, suitable for spray booths, restaurant exhausts, poultry houses, etc. 10" Fan, wt. 8 lbs. (Item 10E) \$11.95
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Complete with rubber plug and outlet. A Ter-
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Heavy duty, made by B. F. GOODRICH for industrial use. Provides instant speed changes for any drive. For machine tools, dryers, printing, conveyors, production lines. Boasts any operation requiring variable speed. Employs reliable "trouble free" planetary system. No hydraulic power losses. Infinite range, smooth operation, easy installation. 3 sizes: 1/2-1 hp, 3/4-1 1/2 hp, wt. 55 lbs.; 2-3 hp, wt. 105 lbs. (Item 624) \$252.50 and \$352. Our prices: \$79.50, \$89.50 and \$114.50

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A tremendously powerful hydraulic press, capable of exerting 18,000 lbs. pressure. Pays for itself many times over—straightening bent connecting rods, king pins, crank shafts, axles, link pins and bars—or pushing out frozen bearings and bushings. Developed pressure under precise control and visible at all times on accurate gauge. Complete with both large and small anvils and dies to straighten any kind of curve or bend. (Item 624) Wt. 110 lb. Actual list price \$365. Our special close-out price \$69.50

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PUSH BUTTON START

Powered by a rugged 2 HP easy starting Briggs engine. No wiring necessary; just plug in and operate. Plenty of current for all purposes, emergency lights, etc. which require up to 700 watts. Ideal for television and radios. Complete with Voltmeter and built-in winding to charge 6 v. auto batteries. (Item 24) Wt. 75 lbs. Easily fits in car trunk. Be prepared if storm knocks out power lines. Reg. \$275 value \$143.50
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We make every type and size of light plants—Write, giving us your requirements!

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Now, a super efficient portable steam generator that produces live steam at 100 lbs. pressure in seconds from a cold start! Produces large volume of high pressure steam on 2 pints of fuel oil. Instantly cleans sticky grease, dirt, rust, old paint, etc. Implements and road machinery. Pays for itself in few weeks. Sterilizes soil. Sterilizes as it cleans—fruit equipment, etc. Fully automatic—oil fired with new built-in lifetime bronze water circulating pump. Draws water from bucket or hose. Simple and safe—anyone can use it! Built-in safety valve. Complete with 12 ft. of hi-pressure steam automatically mixes in water solution. Stired. Wt. 250 lbs. Item 463. Special factory price \$329.50

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Completely self-priming! No foot valve required. Tremendous capacity—100 gal. per min. 1" Special impeller pump to handle muddy or sandy water. Simple to operate—simply start engine and watch the water go. Powered by a rugged, easy-starting 2 HP Briggs engine. Pre-lubricated sealed bearings for years of heavy low-cost service. Big 1 1/2" Model. Item 505. Wt. 70 lbs. Factory price \$134.50

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A powerful pump that handles up to 15,000 gal. per hour. Easy to operate. Self-priming (after initial prime), no foot valve needed—maximum rate of water per horsepower, yet handles water containing a large percentage of stone, gravel and mud. 2 in. suction and discharge. Powered by an easy starting 6 hp. Wisconsin engine and mounted on big rubber tired wheel. Wt. 280 lbs. (Item 280). Special Factory price \$299.50
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Tremendous air movement (1800 CFM) and quiet operation make this double inlet 10" turbine blower unbeatable for heating, cooling, drying and air conditioning. Ideal for attic or barn ventilation, converting gravity heating, etc. Operates with any blower, etc. Operates with any bearings. Includes variable speed motor pulley and belt. Dimensions 19" x 18" x 16". Outlet opening 13" x 11 1/2". Wt. 45 lbs. Item 245. Reg. \$150.00. Factory Special \$27.50
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It's a lawn mower. It's a power sickle. It's a cultivator. New! With power reverse! Improved Master Gardener with new extra power and a full gear train, giving forward, neutral and POWER REVERSE! Works for you the year 'round. Does terrific job of cutting grass or weeds, or prepares mellowed deep seed beds without labor. So well balanced that any woman can easily handle it. Has two built-in clutches controlling motion and 10 different drive. New gear tread tires assure non-slip drive. Performs better—does more than tractors costing twice as much. Converts in minutes to Tiller, Sickle, Power Mower, Snow Blower, etc. Basic self-propelled tractor with famous 2 1/2 hp. Clinton engine complete with rewind starter. Wt. 110 lbs. Special \$129.50
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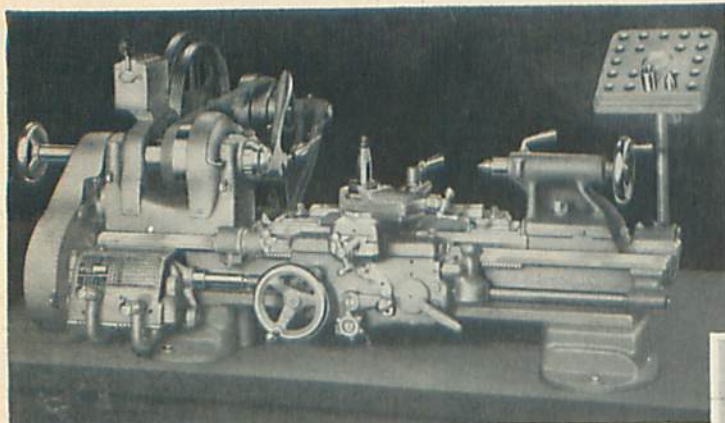
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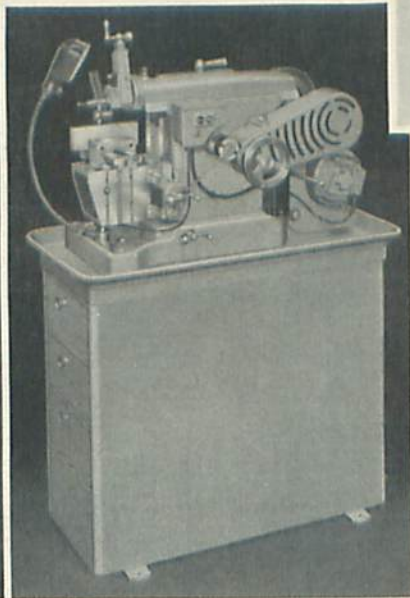
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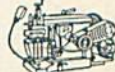
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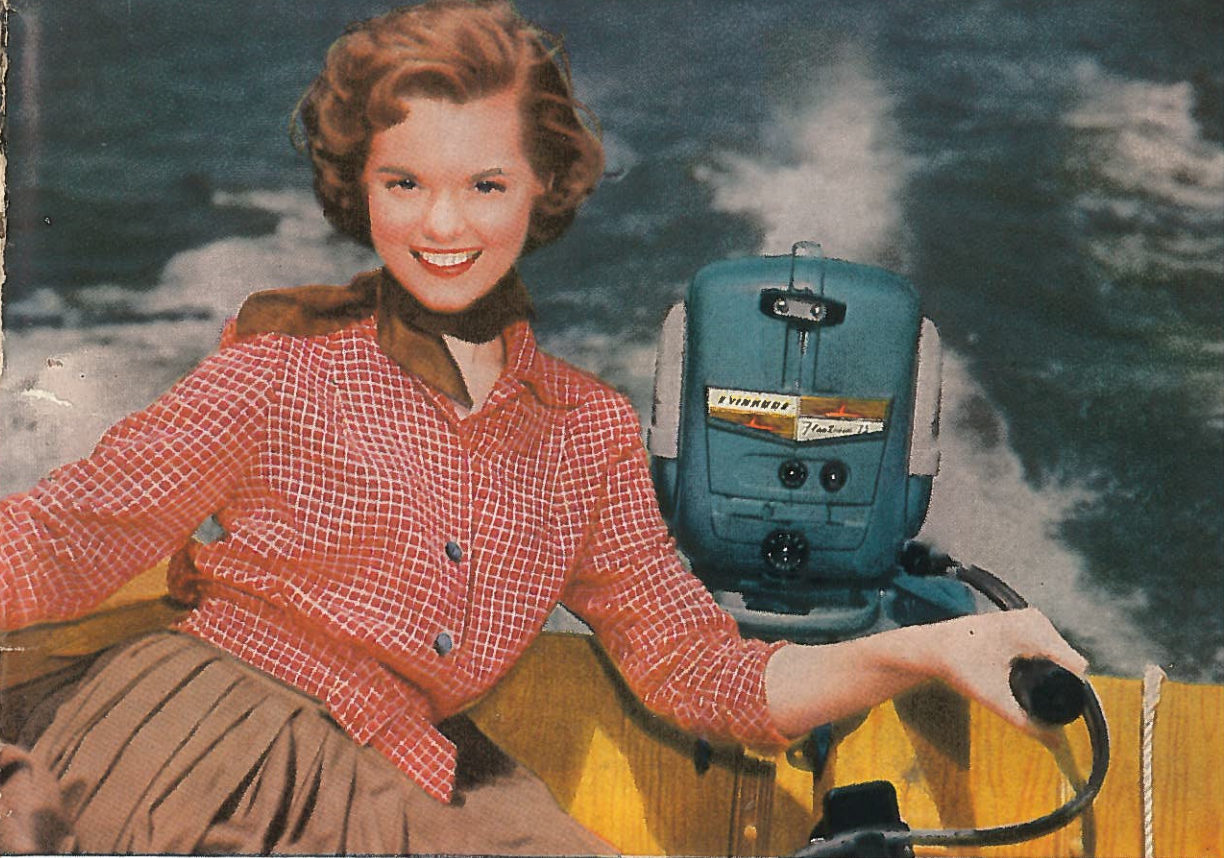
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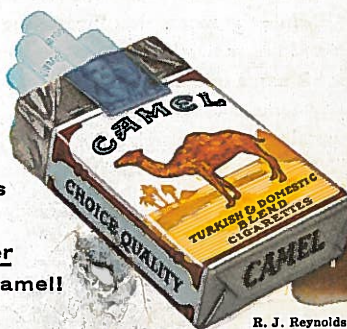


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